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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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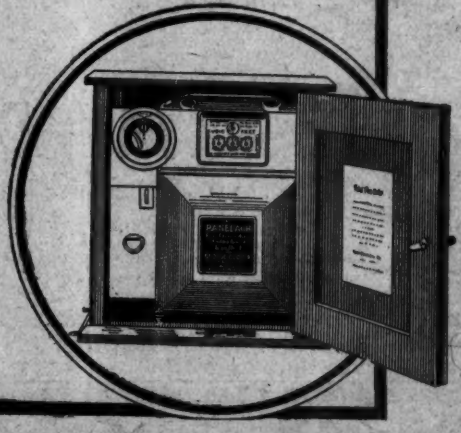

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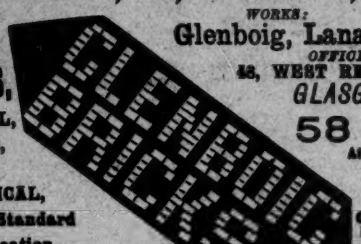

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VOL. CLXIII., No. 3148.] WEDNESDAY, SEPTEMBER 12, 1923. [75TH YEAR.

EDITORIAL NOTES.

The Exhibition and the Conference.

THE arrangements have been completed for the joint meeting of the Junior Gas Associations and the Salesmen's Circles in the Conference Hall of the National Gas Exhibition, Birmingham, next Saturday week. The conference is only part of the day's programme; for (at the risk of bringing censure upon ourselves from some quarters) we declare the opinion that the inspections which will be made by the visitors of the modern gas appliances—working and otherwise—in the exhibition itself, both prior to and after the conference, will be equally as important as the conference. It will be a day filled with good things; and therefore we hope very sincerely that every gas undertaking in the country will see to it that their assistants—in the works, distribution, and gas-service departments—have facilities afforded them for being in Birmingham on that particular day. Reduced railway fares have been arranged on the basis of single fare and one-third for the return journey; and the availability of the tickets will be from the 20th to the 24th, both days inclusive. This concession will be especially useful to the long-distance travellers; and so we hope the executive officials of all gas undertakings will bring their influence to bear to secure facilities for as many members of their staffs as possible to make this journey to see the collection of modern gas-using appliances, and to have conference together under the direction of the Executive Chairman of the British Commercial Gas Association (Mr. F. W. Goodenough).

As to the exhibition, we have been in frequent touch with that enthusiast and untiring worker, the Hon. Secretary (Mr. R. J. Rogers), during the preliminary work of organization; and if in the event it is found that there is an omission of any detail, it may be concluded that it is not his fault or that of the excellent staff so energetically seconding his efforts in the organizing and preparatory work. The position of matters at the end of last week, initial though they were, vouches for the exhibition being well worthy of a visit from representatives of the public from near and far, as from the chief officials of gas undertakings and their staffs. When the latter have been and have seen, we are confident they will want to make-up parties of consumers, and take them for an excursion to the capital of the Midlands; and it will be money well spent, and a good advertisement for gas. Beauty and utility in fittings and appliances will be shown; and working examples will testify how largely economy and efficiency to-day have outstripped the precursors of modern appliances. The "range" of gas application at one time was lighting; to-day we may be forgiven the doubt in our mind whether the "B.C.G.A." invention of "A Thousand-and-One Uses of Gas" compasses the whole. We do not expect all applications, domestic and industrial, to be demonstrated at Birmingham; but some typical ones will be, even to the making and baking of the cakes and other delicacies which many of us are hoping to sample at the exhibition cafés! There has been a lot of work put into the exhibition; and we are confident that, with the help of the exhibitors, who are bound to show their best types, a very fine display will be made, which will demonstrate much to the public and competitors, and that many useful ideas will be picked-up by gas men themselves. We are not surprised at the excellent amount of support that has been promised to this demonstrative enterprise. It has been well handled.

As to the conference of Junior Associations and Salesmen's Circles Mr. Goodenough, as already indicated, will be in the chair, and will address those present on the subject of "Qualifying for Promotion." Qualifying for promotion means also the extension of a man's qualifications for serving the undertaking with which he is associated, and the interests of which it is a duty to promote. There will also be a short address from Mr. Walter Hole on "The Scheme for Technical Education in the Gas Industry." The Presidents of the Junior Associations will be asked to speak each for a few minutes on both subjects; and the Chairmen of the Salesmen's Circles will be invited to give an account of experiences during last session in connection with the new organizations, and their hopes in respect of the future. Satisfied as we are regarding last session's work, experience should yield improvements in the operation and usefulness of the Circles. They will produce this improvement automatically. Increased knowledge gained by discussion, and the added capacity for investigating appliances and penetrating claims, will make their impression not only on daily duties and service, but on the value of the new organizations themselves; and they have given our gas salesmen a debating ground on which they can put types and practices "through the mill" of a widely varied experience. The manufacturers of gas appliances will realize that their products will in future have in the gas salesmen more acute critics than they have ever had in the past; and their likes and dislikes will be fashioned more by the actual capabilities of the appliances they have to handle than by virtues attributed by the manufacturers' own representatives. The manufacturer will count this a gain, as it means that each manufacturer and his competitors will have to work to the highest efficiency, or their goods will not earn the friendship of the men who form the connecting link between them and the public.

To the conference on the 22nd, an hour and three-quarters will be devoted; and tea will be provided at the close by the "B.C.G.A." The remainder of the day—before and after the conference—will be given up to the exhibition. Many are looking forward to it with well-founded expectations.

The North British Presidential Address.

THE proceedings at the meeting of the North British Association of Gas Managers last Thursday were extremely valuable. In that qualitative characteristic, the address of the President (Mr. John M. Smith, of Stirling) has prominent place; for the deliverance was that of a man who regards it as his duty to carry out the best practices possible in the circumstances in which he is situated. There is science underlying the most plain working, if it is performed in its every part in a manner which ensures the maximum result from the prevailing conditions. There is nothing plainer in gas manufacture, generally considered, than the production of coal gas in horizontal retorts, and the generation of blue water gas in one of the approved plants. Yet, in the construction of carbonizing and water-gas generating plants, and in the methods of working, there is room for a considerable exercise of scientific application, having regard to the availability and characteristics of the material which one has to buy. The President calls his horizontal working and blue water-gas making a two-stage system; and, of course, it is such, when one regards the final mixed gas as the product, and not the two gases separately. He prefaces the narrative of his practices with some general observations as to the difficulties of the engineer to-day in making selection of gas-producing plant, owing to the variety of systems extant and the incomparability of much of the data that have been published. This is due to a want of

co-ordination in the basic elements of data relating to costs and yields. One set of figures may connote one thing, and a second set another; but on the surface the difference is not apparent. It is only when one is able to get below and find out the elemental constitution of the data (and this cannot be done without the assistance of the authors) that one is able to ascertain the true values of the figures. The general adoption of the therm system will help engineers to arrive at a fairer estimate of the value of a plant per ton of coal carbonized—but still incompletely without information as to the quality of the coal used. Quality of the material and of the primary product are both factors in true decisions as to the type of plant to employ; and local conditions as to the secondary products markets is another. Mr. Smith does not present the results of his "two-stage" working behind that meaningless (if unaccompanied by calorific value per cubic foot) term "cubic feet;" but he states his gas results in therms, which offers immediate knowledge as to the values that he obtains from his plants. Would that all occupants of presidential chairs and authors of papers did the same thing!

The President does not say that he would maintain adhesion to horizontal retort working if the conditions of his plant enabled him to make fresh choice. But he cannot at the present time discard what he has; and what he has is very suitable to the physical characteristics of the coal in his immediate neighbourhood. It is only a rational proceeding to utilize existing plant in the best possible manner, until it actually arrives at a stage when it will pay to supersede it by plant having higher efficiency. Admittedly, there is considerable loss going on in the industry to-day through existing carbonizing and water-gas plants not being worked up to the efficiency of which they are capable; but it is not the case at Stirling. This, however, by the way. From what Mr. Smith says, he has found the secret of giving to his settings such long life that we question whether he has any clear knowledge as to when he will be in a position to discard them, and to bring about a change in his production methods. He has no particular cause to be in a hurry. The horizontal retort plant was erected in 1907-8, and extended in 1910; and Mr. Smith's description of it is that it "is still full of life, and is doing excellent work." One reason for this longevity is that silica segmental retorts have been adopted; and therefore not only is the wearing quality good, but repairs and renewals can be effected at a minimum of expense and trouble. He calculates the saving by these retorts at 33⅓ p.ct. per annum. Therefore, if the constructional costs are somewhat greater than in other types of settings, there must be more than compensation in the percentage saving.

By experiment and close observation, the President has brought his settings up to a high pitch of perfection; and, in this connection, there are some practical points which other engineers may note and profit by when contemplating the adoption of this material and type of setting. The expansion and contraction of silica refractories have caused much discussion in relation to the best jointing material to be used. But considerable improvement has recently been made in silica material itself in regard to expansion and contraction; and now, after a setting has been heated up, Mr. Smith assures us "there is no after or permanent expansion in use." This being so, he has found it preferable to joint the segments in the ordinary way with silica clay, as the thermal expansion of 1 p.ct. which takes place squeezes out part of the jointing material while it is still in the green state; and, there being "no after or permanent expansion," the method ensures that the retort is absolutely gas-tight from the commencement. It will be remembered that the report presented by the Refractory Materials Committee, at the last meeting of the Institution of Gas Engineers, included the results of an investigation, by Miss D. Jones, B.Sc., and Mr. W. Emery, into the constitution of jointing materials for silica refractories. From the results, it was clear that while care must be exercised in the selection of the constituents for jointing materials for silica refractories, it may be taken as a general proposition that the more nearly a jointing cement approaches in chemical composition and physical behaviour that of the bricks with which it is used, the more satisfactory are the results obtained. Another important point is brought out in the address in this connection. It is the question of temperatures in the initial stages of heating up. If there is careful treatment, no trouble will be experienced. Very slow and gradual heating at the beginning is essential, in order to save subsequent trouble; and if this precaution is taken, there is little fear of difficulty. The old assumption that the critical period with such retorts was when they were showing a dull-red heat, has been proved fallacious. Care must be continued until the retorts are at red heat; and then there is little danger in speeding-up the heating process. Another point is that with segmental silica retorts, it is better to build the entire settings—pier walls, &c.—of silica material, as when ordinary fire-clay bricks are used there is a liability to retort distortion. Constructional costs are higher; but life, ease of working, and improved carbonization results give good value to the additional expenditure. Heavy charges of local highly-coking coal are comfortably dealt with in the retorts, and the coke is easily discharged.

We need not say anything about the Humphreys and Glasgow blue water-gas plant which the President has in use. The methods of operation are described. A useful accessory to the plant is the dust-arrester which comes into operation during the blow period, and which captures the fine dust from the stack. The dust recovered is a "bye-product," being sold for cement block manufacture, for which its physical characteristics make it particularly appropriate. In every part, it is seen that the President is not satisfied with rule-of-thumb procedure; but recourse is had to scientific considerations and methods to help in the achievement of excellent working and results. Exactitude may cost a little additional money; but if a good profit is returned on the extra expenditure, then it is money well-spent. The analyses of the coal gas and water gas are of a character that leaves nothing to be desired. Even the blue water-gas plant is able to show a thermal efficiency of 58·7 p.ct., excluding the steam for the turbines. The working results for last year are highly interesting. The straight coal gas had a calorific value of 581 B.Th.U., from a good coal—containing 33·1 p.ct. of volatile matter, 61·3 p.ct. of fixed carbon, 1·8 p.ct. of moisture, and 3·8 p.ct. of ash. The calorific value of the water gas was 310 B.Th.U.; and in the mixed gas there was 35·8 p.ct. of water gas. The result is that the mixed gas had a calorific value of 484 B.Th.U. The make of coal gas per ton was 61·57 therms; of water gas per ton, 208·12 therms. The quantity of coal used was 11,396·6 tons; and of coke, 1003 tons. The total gas made was 910,563·7 therms, of which 701,739·8 was coal gas. There is one figure to which we should like to call Mr. Smith's attention, as well as that of other engineers who follow the same practice. We do not think it is right to take the total therms produced by both the coal and water gas plants, divide by the tonnage of coal alone, and say that the make of mixed gas per ton is 79·86 therms. Seeing that the coke market is deprived of the coke used in the water-gas plant, strictly it would be fairer to add together the coal and the coke, making 12,400 tons, and with this divide the total make of mixed gas (910,563 therms), which gives a result of 73·43 therms per ton of material used, instead of 79·86 therms when the tons of coal alone is taken as the divisor. When the total tonnage of material is taken, and a result of 73·43 therms is obtained per ton, this is 11·9 therms per ton over the coal gas showing alone; and this 11·9 therms, multiplied by the total tonnage of material, shows the economy Mr. Smith achieves by his "two-stage" process and studied methods of working. At the same time, he has 8¼ cwt. of coke for sale per ton of coal carbonized, which suggests a low fuel account. We shall be told that the coke used for water-gas making is part of the original coal; and that in steaming verticals, the total make is based on the tons of coal handled. But in these separate plants the comparison is between the coal-gas working alone and the mixed gas. Therefore all factors should be taken into account in assessing the additional benefit.

The working results are only consistent with the progressive policy at Stirling. The Company, with that at Coatbridge, led the way among the gas undertakings of Scotland in coming under section 1 of the Gas Regulation Act; and once matters under the new state of things got into working order, there has been every satisfaction. Closer attention may be required to manufacturing details and to the utilization of the primary product; but Mr. Smith sees in these obligations benefit to every gas undertaking. So do we; and so do all long-sighted men. Holding this belief, we can heartily endorse the Presidential view: "I am of opinion "that, if the gas industry of this country is to maintain its "position as a scientific and efficient organization, the whole-"hearted adoption of the Gas Regulation Act can no longer "be delayed."

Ammonia Liquor Concentration.

A useful paper was contributed to the proceedings of the North British Association by Mr. A. S. Nisbet, of Paisley. In brief space, it brought before the members considerations for and against the installation of plant for the concentration of ammonia liquor. Whether or not such plant should be adopted, either independently of, or in conjunction with sulphate of ammonia plant, depends primarily on whether there is a local market for the concentrated ammonia, such as there is at Paisley, where it pays better to concentrate the liquor than to make it into sulphate of ammonia. Another factor in adoption is, where the crude ammoniacal liquor is sold, the cost of transport to the distillers' works. If this is heavy, concentration would, as Mr. Nisbet points out, afford considerable relief by the reduction of the bulk. Further, there have been many references in the annual reports of the Chief Inspector under the Alkali, &c., Works Regulation Act to the waste that goes on through the inability of some works profitably to manufacture sulphate of ammonia in these times of high costs. The responsible managers of such works should look into this question of concentration, to ascertain whether in it there is any profit for them, rather than continuing to run to waste a valuable product.

There is a good deal of encouragement in Mr. Nisbet's paper to make such an investigation, though he warns against taking-up the process unless local conditions are favourable. Where there is a demand, some works find it profitable to have both a sulphate plant and one for concentration. The cost of a plant for concentration is only about half that of a sulphate of ammonia plant for handling the same quantity of liquor; and one operator is sufficient. The plant is simple and efficient, and can be shut-down or started-up at will. It is illustrated in the paper; and there are a few hints, from the experience at Paisley, as to what to avoid in the structural material and as to a few details in the design. Changes that have been effected in the preheater are responsible for more comfortable working and improved results. Again, in the early days, there were hopes that all gases would be condensed, and that there would be no need to cover the measuring tanks, or to have a purifier to trap the escape of harmful gases. But events proved the wisdom of tightly covering the measuring chambers, and making provision for preventing the escape of sulphuretted hydrogen. In the working of the plant at Paisley, the crude liquor of 3·75° to 4° Twaddel containing 1·44 p.ct. of ammonia is raised to 22° or 23° liquor containing 16 p.ct. of ammonia.

Concentration of ammoniacal liquor is by no means a new subject in the gas industry. Several undertakings were working plants during the war; but many have now discontinued their use. But there are now the other reasons given by Mr. Nisbet why at all events inquiry might well be made by some undertakings to ascertain whether there is profit in the process for them—either in respect of demand for concentrated liquor, or to save a considerable part of the cost of the transport of the crude liquor. In the latter case, it would all depend upon the relation of transport costs to those of concentration.

A Matter of "Seconds."

The important question of the conservation of the lighting load was again under discussion at the meeting of the North British Association last Thursday. In the spring, a paper on the subject, which attracted considerable attention, was read before the Association by Mr. E. Edison Stones; and on this occasion two short papers relating to it were submitted by Mr. James Bell, of Dumbarton, and Mr. John Wilson, of Motherwell and Wishaw, to introduce a discussion. We propose to defer comment on the papers and the discussion until next week. In this article we wish to draw the attention of gas engineers and the sales departments of gas undertakings, as well as the wholesale vendors of mantles, to a matter which has a seriously damaging effect upon the maintenance and enlargement of the gas lighting load. Most gas undertakings now vend good-grade mantles at low price; but there are wholesale dealers who spoil what prudent undertakings are doing by selling to local traders in gas-lighting accessories lower priced "seconds"—some badly finished and deformed. Such mantles will not properly fit the flames; and so they reduce lighting efficiency, and have a not inconsiderable part in bringing discredit to gas lighting. We have had forwarded to us samples of mantles sold by wholesale dealers. Were we mantle makers, we should regard the marketing of such productions as very disparaging to ourselves and to our reputation. Is it to be believed that those who sell such mantles do so without knowledge of the harm that they are inflicting on the gas-lighting business, and of the fact that the greater the noxious effects of their proceeding, the greater the contribution they are making to the diminution of the gas-lighting field? They are injuring not only the gas-supply industry, but their own interests; and this ought to be so manifest to them as to cause them to refrain from this class of business. The gas industry is undoubtedly moving in the direction of the improvement and better maintenance of the lighting equipment in houses, shops, and factories; and it must cause a great deal of resentment on the part of supply undertakings if they find their efforts are largely negatived by the wholesale houses doing business in inferior mantles with local retailers. If there is a continued sale of these mantles, the industry must take steps to counter it; and they can do this by strongly advising, through advertisement and circular-letters, not merely the local traders, but the whole of their consumers, only to buy recommended mantles.

Probably we shall be told that the sale of these makes of mantles is necessary, in order to compete with the cheap inferior mantles dumped into this country in large quantities from abroad. If so, and the practice is persisted in, then it will show that the gas industry, in its efforts to raise the general standard of gas-lighting efficiency, are not voluntarily to be aided by some of those wholesale houses with whom it has large business connections. They cannot deny that injury is being done to the lighting business by the cheap and nasty types of foreign mantles; and yet some of them are helping in that injury by the sale of defectives. This makes the difficulties of gas undertakings still harder. They cannot hope to do much (other than under conditions to which reference will presently be made) to reduce the demand for the imported low-grade mantles, when traders in this country are supplying mantles that are inconsistent in more ways than one with a high-grade article, and so degrade the efficiency of gas lighting. The matter is a serious one; and it requires to be dealt with seriously. It is clear to us that the gas-supply industry, in the defence of the expansion of the lighting load, has not only to contend with the competition of electricity, but has also to fight the dumping in this country of ill-conditioned foreign mantles, and the sale of mis-shapen and otherwise defective seconds that issue from mantle works at home. The evil effects of these on the lighting business are highly favourable to successes on the part of electricity. The home mantle makers have also the low-grade importations with which to contend; but their method of doing this facilitates the work of the electrical competitors. They appear to overlook this point. But it comes to this—that between the gas undertakings of the country and British makers of mantles, there is much in common. It is to the interests of both that low-grade, badly finished, and ill-shaped mantles should not be sold in this country; and it seems to us that the two should join forces in a campaign among the retailers and the gas consumers in every gas-supply area against the sale of really low-grade imported mantles. Then there would be less reason for the sale of "seconds." Temporarily, perhaps, even in high-grade sorts, Continental makers are in a more favourable position than British manufacturers, owing to the current financial conditions. But that position is not likely to last for ever; and if the home makers play their cards properly now, the time will come when, with gas undertakings buying only high-grade mantles, they will be in a position to capture and retain the whole of the trade in them. Those gas undertakings that propose to make inspection of consumers' fittings and maintain them free, charging only for materials, will be able largely to govern the types of mantles employed in their supply areas. The recent Departmental Committee on Therm Charges suggested that inspection and supervision by gas undertakings of their consumers' fittings was a question of policy that should be carefully looked into. The matter has been discussed at a conference at the Board of Trade; and we should not be at all surprised to find at no distant date that there is legislation on the subject. We ask our home mantle makers in all friendliness to make note of these developments, and, in doing so, also to look ahead. It may be found that a revision of policy will be a politic and statesmanlike act.

Trade Union Troubles.

IT is many a long year since the Trade Union Congress has been held in such circumstances as those of the one in Plymouth last week. Many of the delegates must be quite pleased it is over; for in every direction it disclosed constitutional weaknesses of a very grave order. Foremost among these is the enormous falling-away of members from the unions, since the aggregate membership reached high-water mark in 1920. From Jan. 1, 1921, to Jan. 1 this year, the membership of the trade unions affiliated to the Congress has fallen from 6,417,915 to 4,369,268—a drop of more than 2 millions, or nearly 32 p.ct. This is a decline that is enough to cause depression in the stoutest hearts of trade union leaders; and the significance of it is that it has occurred in such a short space as two years, and so has shown how quickly membership atrophy can weaken the power of the unions. . The President of the Congress (Mr. J. B. Williams, Secretary of the Musicians' Union) struck some low notes in his address. He referred to the decline in anything but cheerful mood; but he tried to palliate it by making a comparison with 1913—ten years ago! He might have made a better job of it by going back still farther. But the plain fact is that from the peak of membership there has been such a tumble that the secessions from the ranks in two years have been equal to one-third. The leaders of the unions know full well the reasons for this; they require no investigation. There are some causes which they could remedy had they the strength of will to do it. There is, of course, the general trade depression. Directly, they could not do much to relieve this; but the discussions last week showed, as they have done before, that some enthusiasts would like to do certain things in the belief that they were benefiting the workers, while all the time actually operating, by putting this country out of the markets of the world, for the shortening of the demand for their labour—both skilled and unskilled. Then there are the differences within the unions themselves, due largely to the extreme political or socialistic influences that have secured potent domination in the organizations; and the resulting policies of various unions have been the means of splitting from them the adhesion of many men. Organizations that aim at getting within their ranks for specific and legitimate purposes men of all shades of political opinion ought to keep wholly free from party politics. But what ought to be is precisely what has not been; hence aggressive and destructive tactics that have done much to alienate many men from the ranks of the trade unions. The spirit of the leaders last week was not anything like it was in the palmy days of not long ago. Beyond the decline in membership, they have other causes for anxiety. The recent refusal of members of certain unions to honour agreements is one matter; and another is the recusancy of a constituent body in a Federation in respect of a settlement entered into collectively, with the disastrous results seen in the shipbuilding and repairing industries to-day. Then there are the differences between rival unions, which appear to defy the wit of man to compose. Altogether, there was a good deal of acrimonious discussion at the Congress this year; and while some matters that were debated were good in principle, there were others which obtained favourable resolutions that must be numbered among the impossible.

Dr. Carpenter's Therm Meter.

In our "Register of Patents" to-day will be found the main portions of the patent specification of Dr. Carpenter's therm gas-meter. In this, the inventor has surmounted what some people thought would be an impossible task. The rating of the gas-meter (wet or dry) has been converted from cubic feet to a method based upon capacity in terms of B.Th.U.; and either form of meter can be adjusted to any given calorific value of gas. By the simple calibrating means provided, changes of calorific value can be effected without any structural alteration of the meters. More as to these matters will be found in the extracts (on a later page) from the patent specification.

Large Gasholders.

A translation of the views of a German engineer, M. Niemann, of Dessau, on the structural details of the Sydney gasholder in comparison with the pioneer East Greenwich one, is given in our columns this week. Local circumstances must always take part in the design of engineering structures of this kind, and not theoretical considerations alone. We have no doubt the designers of the Sydney holder have sound defence for putting strength into their work somewhat in excess of that of the East Greenwich erection; but it says much for the great engineering ability of Sir George Livesey that, thirty years and more after he designed the latter, and led the way in these mammoth structures for the storage of gas, a German investigator should conclude that "the frail appearance of the East Greenwich holder conceals a great power of resistance, and its method of construction has a great deal to recommend it when low initial cost and strength are required, as they were in 1892, and as they must always be in the struggle with the gas industry's competitors." Even so, if the President of the South Metropolitan Gas Company (Dr. Carpenter) was erecting a holder of the same capacity as, or larger than, that of his old revered chief, there are probably points about its design in regard to which experience has suggested to him beneficial changes.

Ten-Minute Papers.

The authors of the papers presented at the meeting of the North British Association last week were asked to limit their contributions to ten minutes each. They followed their instructions with precision, and admirably It would not be advantageous to apply this rule always; but there are papers read that occupy considerably longer than ten minutes, which, if compressed so as not to exceed that time would have their value much increased. The art of condensation in writing is not possessed by everybody; but we have frequently wished it was a more general accomplishment. One of the papers read was on the concentration of ammonia liquor. A plant has not yet been devised which would assist in the concentration of technical papers.

The Japan Disaster.

A paragraph in the "JOURNAL" last week (p. 687) referred to the reports that had appeared in certain London papers that gas had contributed in Tokio to the fires that accompanied the earthquake. From a graphic account sent to the "Daily Telegraph" by its own correspondent, it appears that electricity and oil had large part in accentuating the horrors; but, so far as we have seen, nothing more has been said about gas. One eye-witness says: "Live wires were strewn everywhere; and many people were electrocuted. The screams of the people buried in the wreckage, I will never forget." Another saw the passengers in a tramcar—all dead. "When we asked a Japanese how it happened, he pointed to the trolley wire." As to oil, a further informant said: "When the earth quaked, the great oil-storage tanks split, and poured millions of gallons on the demolished buildings; and there arose a river of flame."

Real Socialism.

One of the most material and rational forms in which the aspirations of the modern socialist can be achieved is through co-partnership. It makes the worker a partner in industry; and he shares in the profits. At any rate, that is how it works out in the gas industry; and the gas undertakings that have adopted the system make no condition as to whether or not the men they employ belong to a trade union. But some of the leaders in the trade union world are under the impression that co-partnership is simply a piece of strategy having for its main object the undermining of the trade unions. Facts show this to be an ungenerous view. Those leaders who have had experience of the working of the system in the gas industry know better. In the Industrial Council they sit and collaborate with men directing co-partnership undertakings. In the coal industry areas where the men are producing each his proper share of coal per day, they too know that there is something beneficial in the system. However, the belief is not general; and there is a feeling in some places that there is something sinister about it so far as trade unions are concerned. At the Trade Union Congress last week, on the invitation of Mr. Ben Turner, a resolution was passed expressing the belief that capitalists are making attempts to introduce forms of co-partnership in order to mislead the workers and prevent trade union solidarity. The General Council were also instructed to explore the workings of the various labour co-partnership and profit-sharing concerns, with the view of reporting upon their advantages and disadvantages to the next

Congress. If the Council enter upon this work with open and impartial minds, they will learn something that will show there is nothing incompatible between co-partnership and trade unionism; and if they go far enough, they will find many a co-partner in the gas industry who has received, through the beneficent scheme, financial improvement that has helped him socially and eased his way in life, and others who have entered into retirement from work with the proceeds of co-partnership contributing substantially to the enjoyment of a comfortable old age. Would the trade unions seek to deny their members these advantages? If they attempted it, they might do themselves more harm than good. Indeed, the trade unions should, in the interests of their members, put co-partnership prominently forward among the constituent items of their creed. We should imagine that those who have been enjoying the results of co-partnership for years will regard the union leaders in anything but a complimentary light if they do not.

A Six-Hour Working Day.

It is a good thing we are not governed by some of the labour extremists. If we were, there would be a good chance of a mighty industrial and national crash coming about. A man's labour is something of which he should be allowed to dispose as he thinks proper; but some fanatics think that it is something that should be controlled by law. If the maximum time a man is to work per day is made a matter of law, then that maximum should also be made the minimum, except in the case of old age or certified ill-health or other physical incapacity. If this were not done, there would—however prosperous the trade of the country (if it were ever prosperous)—always be some lazy men, whose only occupation would be year in year out loafing outside public houses when closed, and taking rest and something else inside when open. There are many others who would regard even (say) six hours as far too long a stretch for them to work in one day; while there would be others, like ourselves, who prefer, with irregular work to be done, to number our hours just as the inflow of work demands the time for its accomplishment. Hours of work cannot possibly be made uniform if the complex machinery of the country is to be kept going. Mr. Cramp (N.U.R.) apparently thinks otherwise. At the Trade Union Congress, he moved a resolution declaring that the time has arrived when the organized workers should demand a six-hour working day; and this he regards as a "reasonable maximum day." There was more common sense in the attitude of Mr. E. Duxbory, who urged that organized labour should first consolidate its position on the eight-hour day. He added that, while he would like a six-hour day, he felt that it would so increase the cost of commodities that the foreigner would not be able to buy them. That would be a bad outlook for labour. Apparently Mr. Duxbory has been studying the extent to which home industries and labour are dependent on the custom of the foreigner. In the end, a resolution was passed recording that it is in the best interests of the workers that there should be a national law governing workers' hours of labour, and instructing the General Council to promote a Bill giving effect to the legal establishment of an eight-hour day and a forty-eight hour week.

Trade Union Membership.

In an editorial article this week, reference is made to the fall, by upwards of 2 millions, in the number of trade union members during the past two years. Some of the figures for Jan. 1, 1921, and Jan. 1, 1923, for individual unions will interest our readers. Here they are: Mining and quarrying, 1921, 937,412; 1923, 784,167. Railways, 1921, 616,196; 1923, 447,374. Transport (other than railways), 1921, 470,595; 1923, 406,650. Engineering, 1921, 695,018; 1923, 443,450. Iron and steel, 1921, 198,927; 1923, 158,43[illegible]. General workers, 1921, 1,117,680; 1923, 390,677.

North of England Gas Managers' Association.—The autumn meeting will be held on Friday, the 21st inst., at the Alexandra Hotel, Bridlington. The President (Mr. J. Kelly) will deliver his address; and there will be a paper by Mr. R. C. Taylor, B.Sc., of Bridlington, on "Considerations Relating to the Future of Sulphate of Ammonia." The works will be visited by the members; and tea will be provided at the invitation of the Chairman and Directors of the Gas Company.

PERSONAL.

The Salford Town Council have decided to confer the freedom of the Borough upon Alderman F. S. PHILLIPS, the "father" of the Council—now and for many years Chairman of the Gas Committee. Questioned as to the future of the gas industry, Alderman Phillips refuted the suggestion that gas had had its day. Gas, he said, was coming, not going. What was wanted in the future was men who would show them better methods than they had at the present time of utilizing their resources. The war had demonstrated to the country the value of its coal resources. Scientific research must be developed, so that every atom of energy might be harnessed and used for the benefit of industry. The country had to be educated to realize that gas had to displace coal as a smokeless heating factor, and that it was the cheapest and best form of heating. From this point of view, said Alderman Phillips, electricity could not compete with gas; and the time would come when gas-fires would be generally used in houses. As a result, valuable products would be conserved and utilized for the purposes of industry.

ELECTRICITY SUPPLY MEMORANDA.

IT is difficult to understand why it is that some of the electrical journalists have got it into their heads that gas men admit the superiority of the electric light over incandescent gas lighting.

An Illusion.

They are constantly trotting out some opinion of the kind, without mentioning who these gas people are who make such an admission; and, as they do not do this, we are afraid that it is a case of the wish being father to the thought. The "Electrical Review," which is old enough to know better, made the statement only the other day that "the supremacy of the electric light over all other artificial illuminants being no longer disputed, even by competitors, perhaps we electrical people are inclined sometimes to overlook the possibilities of further developments in this direction." When our journalistic friends speak of competitors, they are referring to the men of the gas industry as a whole; and we assure them, on behalf of gas men, that they are as much mistaken on this point as to the views of the gas industry as they are on some other topics. There may be a few gas men who look at the electric light business through one end of a telescope, and at the gas-lighting business through the other end. But, just as one swallow does not make a summer, so these men must not be taken to represent the views of gas men generally. Ask any electricity station engineer who has a progressive gas concern with which to compete, and which is keen on the preservation and extension of the lighting business, whether gas lighting is played out, and has not good merits that appeal to the public; and he will tell you what he knows from experience. The best field that the electrical men have for lighting extension is where the gas-lighting business is allowed to suffer erosion through neglect. But this is not the case everywhere; and where it is not so, electricity finds that competition is very severe and difficult. Moreover, we believe a new movement is starting among those gas suppliers who have hitherto not done anything, or very little, to eliminate the obsolete and inefficient, and to bring domestic lighting up to modern standards. This can be done much more economically than by wiring houses and purchasing electric-light fittings and lamps, and the accessories necessary for defeating the eye-injuring propensity of the high intrinsic brilliancy of the lamps.

Extended Shop-Window Lighting.

The inspiring cause of the "Review's" erroneous statement as to the admission by competitors of the supremacy of the electric light is the revival by the Electrical Development Association of the shop-lighting extension campaign during the autumn. The confession is made by our contemporary that the ordinary shop-hour window lighting is not a satisfactory load for the central station. This is perfectly obvious, what with summer time and the closing of shops earlier than was formerly the case. The campaign has for its object the promotion of late shop-window lighting, which, it is hoped, will turn "a non-paying proposition into a remunerative one." With this end in view, the Electrical Development Association are proposing to launch a scheme of advertising in the special organs of the retail trades. Supplementing this is a pamphlet, which is said to set forth new arguments, as well as re-stating old ones, "in a striking cover that will attract the attention of shopkeepers." We take it from this that it is the cover, and not the arguments, that will have supremacy in attracting the attention of shopkeepers. This extended shop-window lighting is purely for advertising purposes; and some tradesmen have adopted the idea. The electrical men who have secured the additional custom find that it "widens the peak without increasing its height." The "Review" also says this late shop-window lighting will add to the brightness and cheeriness of our streets. No doubt; but some shopkeepers will say they are not called upon to bear the expense of doing this after business hours.

Business Extension Difficulties.

Mr. Henry M. Sayers has been writing at some length in the "Electrical Review" on the subject of "Electricity Supply Prices and Profits." We do not intend to discuss what he has written, because we have not made a complete study of his argument. But this we do know, that there are some electricity undertakings that make no profits, and yet have to charge high prices; there are others that would not make any if they did not charge high prices to their lighting consumers—prices that are far removed from those attenuated ones that are offered to tempt a little spasmodic heating and short-period "cooking" business; and at the prices they obtain, some undertakings would be better without the business than with it. It would be an edifying study for anyone to make, to take all those elementary principles that were at one time so scrupulously observed in framing electrical charges, and ascertain how far they have been applied in the devising of some modern electricity tariffs to capture domestic electrification. This subject the electrical people show no inclination overtly to consider—much less discuss. However, towards the end of his article, Mr Sayers makes some general observations. He says the great field open to every supply undertaking is the general domestic load, of which cooking, small power applications, and, to some extent, heating will provide the main bulk. Electricity undertakings do not seem to make much headway in taking possession of that field. Mr. Sayers proceeds to say it would be wrong to imagine that the domestic lighting field is completely occupied. That is a fact of which every electrical man is fully aware; and they know that further business is harder to get now than it was formerly. Due to this is the never-ceasing complaint of electrical contractors that business is not good. It is pointed out in the article that the number of electricity consumers in London is only about one-eighth the number of gas consumers. We suggest in this connection a matter for investigation by the electrical people; and the results might possibly enlighten them as to the difficulties that lie ahead for them in the matter of dealing with a large part of the custom for which the gas industry caters. If they work out the average revenue from the gas consumers of London, they will, we believe, find that they fall far below the average of the electricity consumers; and yet the bulk of the consumers use gas not only for lighting, but for cooking—many for partial heating. But for all purposes a common flat rate in each district is charged, except where discounts are allowed for abnormal consumption. That is a matter worth consideration by our electrical friends in relation to their own conditions and charges. Moreover, we do not know of any electrical undertaking in any district that could supply the current that would be necessary to meet the cooking load easily borne by gas undertakings in most residential areas between the hours of eleven and one o'clock on Sunday mornings; and we doubt if it would pay them to provide the plant and the mains to do it at the prices at which they try to secure the business. The same with the fickle heating load. Many electrical engineers have begun to question the wisdom of trying to extend this demand. It is not a difficult matter to compose articles in which are strung together a number of platitudes; but behind them, in relation to this subject of electricity supply for domestic purposes, there lie some serious questions, which cannot be disposed of by platitudes—such as: "If a supply is available, and is taken for lighting, it ought not to be difficult to get the consumers to see the convenience and value of other applications."

The Tariff Desideratum.

What Mr. Sayers advocates is an "attractive tariff." Exactly what this means is not explained. There have been launched numerous variations of tariff, all with the view of being "attractive," and of realizing more domestic electrification. However, some of the writer's arguments have a bearing on what we have been saying in the previous paragraph. "An attractive tariff," he remarks, "does not necessarily mean low prices all round. A mere reduction of price may not result in such an increase of consumption as is desired. If it has the result of increasing the maximum demand *pari passu* with the consumption, so that the load factor is not improved, the benefit to the undertaking and its consumers is not so great as it should be." This is a point which has not been adequately taken into account in the work that has been proceeding in the electricity industry to enlarge business. Demand alone is not sufficient; it is the spreading of new demand that is important in order to make better use of the capital invested. This is pointed out when Mr. Sayers presents the desideratum as he sees it. It is that such tariffs should be devised and applied "as will not only increase consumption and demand, but widen the uses, spread the time incidence of the load, increase the utilization and productivity of the capital invested—in short, improve the load factor as well as the consumption." This means that hitherto there has not been success in attaining this desideratum. Time has been expended and brains exercised beyond measure with the view of realizing it; but, as Mr. Sayers is able to write as he does now, and the material results speak so emphatically, there has been failure. The writer of the article is not helpful at present in solving the problem; but he says he may return to it on another occasion.

Big Price Variations.

Concluding this dip into Mr. Sayers' examination of the question, there are a few interesting points relating to prices that we may cite from the end of the article. They refer to a review of the reductions in price during the current year. He cannot give the total effect of the reductions that have been made, inasmuch as in some cases only the new rates are given; and in others the reductions are shown in complex form on multi-priced tariffs, so that, even if fully explicit, one would have to know the proportions of the output to which each applies. That would mean an immense investigation. But, Mr. Sayers points out, a considerable number do give definite old and new rates for the maximum lighting flat rate; and, taking these together, they show an aggregate reduction of 11·7 p.ct. This can hardly be taken as indicative of the order of the reductions. In the power, cooking, and heating rates so far as they are indicated, the proportionate reductions are, on the whole, greater—ranging up to 25 or 33 p.ct. Quite a number of heating and cooking rates are down to the even penny per unit. But there are remarkable differences in prices after these reductions. The maximum lighting rate varies from 4½d. up to 11d.; and the differences do not seem readily explicable by either the locality or the magnitude of the undertakings. There are quite near neighbours with prices in the ratio of 2 to 1, or thereabouts. It is all very interesting; but it is not constructive. It simply impresses the fact of the failure of the tariffs to do what Mr. Sayers and many more electrical men would like to do. But, as yet, a very small part of the public have responded to the tariffs which have been designed to tempt them.

Foreign Tenders for Plant.

The British gas industry is not worried much in its heavy plant section by tenders from abroad; so there is little question as to whether such tenders shall be accepted rather than British ones, which in the circumstances of the times might be higher, as is the case with electrical plant. Before the war, Germany had developed the electrical plant industry to a high state of efficiency, with the result that a very large amount of our business went to that country. But with the outbreak of war, electrical engineers here made pious resolutions that they would not again patronize the German firms. Years have passed; and the financial conditions of Germany are such that the manufacturing firms there are in a position once more to underbid the British ones. Consequently, the responsible electricity authorities are now faced with tenders from abroad that are, as a rule, considerably below those of British firms; and it is very difficult for them to know what should be done. They are between the two stools of loyalty to their country and loyalty to their immediate interests as guardians of the purses of the undertakings the interests of which are entrusted to them. The capital charges of an electricity undertaking are, in the aggregate, the largest contributors to outgoings; and therefore great care has to be exercised in regard to them. We read that the Bradford Corporation Gas Committee recently advertised for tenders for a new turbo-generator, estimated, so the report before us says, to cost between £56,000 and £60,000. The foreign tenders were originally some thousands of pounds below the British ones; but the Committee would not come to a decision immediately. The upshot is that the tender has been let to an English company; but the amount of the successful tender (according to the published report) has not been disclosed. Whatever it is, British capital and labour will be gratified; and no doubt the Committee have not been unmindful of the interests of the ratepayers. Another instance is the Leeds Corporation, the Gas Committee of which required a 10,000 KW. alternator turbine and condensing plant, which was estimated to cost between £20,000 and £30,000. Again the Committee were confronted with the fact that foreign tenders were lower than the British ones; and they could not contemplate placing the contract with any British firms at the prices quoted. But negotiations with the latter led to reductions on the original tenders (amounting it is said to about 15 p.ct.) which will enable the Committee to give the contract to a home firm. This is highly satisfactory in view of the unemployment that exists in this country. At the same time, British electrical manufacturers must, in the making of tenders in the first place, have regard to the competition from abroad; and it is something over which to ponder that, if British firms can execute work at the rate of 85 p.ct. of their original quotation, then some blame may attach to them for the dilemma in which the responsible Committees are placed. But one cannot speak too definitely, seeing that there is such a thing as cutting one's profit down almost, if not quite, to vanishing point, in order to retain the work in this country.

Pulverized Fuel.

Electrical engineers are now interesting themselves in the use of pulverized fuel. They are anxious to get their fuel accounts down as low as possible by obtaining the highest boiler efficiency. The Underfeed Stoker Company, Ltd., are introducing the "Lopulco" system in this country and on the Continent; and one typical example is the plant that is being installed at the Vitry power station in Paris. This will be a considerable and important development. The first installation is four boilers, each with a heating surface of 16,678 sq.ft. The normal evaporation per boiler per hour from and at 212° Fahr. is 140,580 lbs.; and

the maximum evaporation per boiler per hour from and at 212° Fahr. is 210,870 lbs. Each boiler will be complete with superheater and economizer. The normal coal consumption will be 12,800 lbs. per hour; and the maximum consumption 19,700 lbs. per hour with coal of a calorific value of 12,600 B.Th.U. per lb. From the experimental stages, there have also been remarkable developments in America; in connection with one station, an efficiency of 86 p.ct. has been guaranteed, and it is expected that 88½ p.ct. will be attained. Such efficiencies, if continuous, must attract the consideration of power engineers. It has claimed the attention of Mr. S. W. Baynes, Chief Electrical Engineer of the St. Pancras Borough Council; and, as a result of a report he has made on the subject, he and the Chairman of the Sub-Committee have been instructed to visit the United States to investigate what has been done there in the application of pulverized fuel to steam-raising. Pulverizing plants are being placed upon the market from various quarters. The Brierley pulverizer is being exploited by Messrs. King, Taudevin, and Gregson, Ltd., of Sheffield.

GAS MEN AT OLYMPIA.

In connection with the Shipping, Engineering, and Machinery Exhibition now being held at Olympia—a description of the displays at which, so far as they more particularly concern our readers, was given on pp. 680-82 of last week's issue of the "JOURNAL"—a number of official visits have been arranged; and on Monday, among others, many of those interested in the gas industry were invited to inspect the exhibits and enjoy the hospitality of the management. Altogether seven associations were included in the invitation—namely, the Institution of Gas Engineers, the London and Southern District Junior Gas Association, the delegation of the American Foundrymen's Association, the London Branch of the Institute of British Foundrymen, the Institution of Sanitary Engineers, the Institution of Heating and Ventilating Engineers, and the National Association of Master Heating and Domestic Engineers. Along with a number of members, there were present Mr. Samuel Tagg (President), Mr. W. E. Price (Hon. Secretary), Mr. W. T. Dunn (Secretary), and a good representation of the Council of the Institution of Gas Engineers; and Mr. D. C. Cross (President), Mr. W. Grogono (President Elect), and members of the Council of the London and Southern District Junior Gas Association.

A luncheon, at which about a hundred sat down, was given to the Councils of the Societies named and overseas members of them, at which, in the absence of the Hon. Sir Charles A. Parsons, K.C.B., F.R.S. (Hon. President of the Exhibition), the chair was taken by Dr. H. S. Hele-Shaw, F.R.S. (Chairman of the Hon. Committee of Experts). After the Loyal Toast, that of "The President of the United States" was honoured, because of the presence of a number of American delegates. Then Dr. Hele-Shaw addressed a few words of welcome to those present; his remarks being replied to by the Presidents of the respective Associations.

Following the inspection of the many excellent exhibits during the afternoon, there was a reception of visitors by Mr. Frederic W. Bridges, the General Manager of the Exhibition, and then nearly three hundred guests sat down to tea, to which the whole of the members of the different organizations had been invited, in addition to the various Councils. Dr. Hele-Shaw again presided, and said, on behalf of Sir Charles Parsons and the Executive Committee, how glad they were to see so many present. Mr. Bridges also extended a cordial welcome to the guests, hoping they had thoroughly enjoyed all they had seen, and that it would be of benefit to them.

In the evening, Mr. Kenneth Gray, M.R.San.I., and Past-President of the Institution of Heating and Ventilating Engineers, lectured on "Modern Principles of Heating." Of what he had to say, fuller notice may be taken in a later issue. His first point was that we should pay much more attention than is usually given to humidifying the air in our rooms. Moistening the air, he declared, is even more necessary in winter than in summer, because it is at this season that we have to some extent interfered with natural laws. He then referred to some of the defects of existing methods of heating, and said that, in his view, the open fire still seems to produce the best imitation of outside conditions, though it has well-known drawbacks. He was heartily thanked for his lecture, on the proposition of Mr. A. A. Jones.

Food and Cookery Exhibition.—We learn that the twenty-seventh Cookery and Food Exhibition is to be held from Oct. 22 to 26 in the Royal Horticultural Hall, London, S.W. The Hon. Director is Mr. C. Herman Senn; and the offices are at No. 329, Vauxhall Bridge Road, S.W. 1. The profits (if any), as on previous occasions, are to be devoted to educational and charitable purposes for providing free instruction in cookery among the poor and working classes, distributing recipes for economical dishes, awarding scholarships for cooks (men and women), and for grants to hospitals, &c. Some £4500 of the proceeds of former Exhibitions held have in the past been handed over to London Hospitals and other charitable institutions, as well as for educational purposes.

THE CONFERENCE IN BIRMINGHAM.

Junior Gas Associations and Gas Salesmen's Circles.

The arrangements have been completed by the "B.C.G.A." for the Joint Meeting of Junior Gas Associations and Salesmen's Circles in the Conference Hall at the National Gas Exhibition, Bingley Hall, Birmingham, on Saturday, Sept. 22. Mr. F. W. Goodenough will preside. The agenda are as follows:

2.15 p.m. Assembly.
2.20 p.m. Address by Mr. F. W. GOODENOUGH. Subject: "On Qualifying for Promotion."
2.45 p.m. Address by Mr. WALTER HOLE. Subject: "The Scheme for Technical Education in the Gas Industry."
3.5 p.m. Remarks by Presidents of Junior Gas Associations and Chairmen of Salesmen's Circles.
Discussion.
4.30 p.m. Adjournment for tea (at the invitation of the British Commercial Gas Association) in the Conference Hall.

Further information as to the visit and conference is included in the first editorial article this week.

"B.C.G.A." BIRMINGHAM PROGRAMME.

A copy is now to hand of the full programme for the forthcoming twelfth annual general meeting and conference of the British Commercial Gas Association, to be held in Birmingham on Monday, Tuesday, and Wednesday, Oct. 1, 2, and 3, under the Presidency of Alderman John Henry Lloyd, M.A., Chairman of the City of Birmingham Gas Committee.

ORDER OF PROCEEDINGS.

Monday, Oct. 1.

Lecture and Reception.

In the Council House and Art Gallery (Main entrance—Victoria Square).

7.30 Lecture by Dr. C. W. Saleeby, F.R.S. (Edin.) on "Light and Life."
8.30 Reception by the Rt. Hon. the Lord Mayor of Birmingham (Alderman Sir David Davis).
9.0 Light refreshments. Music.

Tuesday, Oct. 2.

Annual General Meeting and Private Conference.

In the Large Lecture Theatre, Midland Institute, Paradise Street (adjoining the Town Hall).

10.0 Assembly of members.
10.15 Welcome by the Rt. Hon. the Lord Mayor of Birmingham.
10.30 Presidential address by Alderman J. H. Lloyd, M.A.
Address by the Right Hon. John R. Clynes, M.P.
Presentation of annual report and statement of accounts, by the Executive Chairman, Mr. F. W. Goodenough.
Announcement of election of President and Auditors for the ensuing year.
1.0 Light luncheon, at the invitation of the City of Birmingham Gas Committee, to be served in the Conference Hall, National Gas Exhibition.
2.30 Official Visit to the National Gas Exhibition.
3.0 to 3.30 Visits to—
1. Saltley Gas-Works (including coke-ovens).
2. Nechells Gas-Works (including coal-testing plant and central laboratory).
3. Windsor Street Gas-Works (including the high-pressure gas compressing plant, meter and stove shops, and heat-treatment shops).
4. The Industrial Research Laboratories and Chief Showrooms.
5. Branch Showrooms and Distribution Centres.
7.30 Dinner by the City of Birmingham Gas Committee to the President, Vice-President, and members of the "B.C.G.A." and visitors, at the Grosvenor Rooms, Grand Hotel, Colmore Row, Birmingham.

Public Conference.

In the Upper Annexe, National Gas Exhibition.

Subject: Gas Service and Domestic Economy.

2.45 Assembly.
3.0 Opening remarks by the Chairman of the Conference, Sir Frederick Mott, K.B.E., M.D., F.R.C.P., F.R.S.
Paper: "Gas Service as an Aid to the Housewife," by Miss E. L. Willans (Principal, Women's Advisory Staff, Gas Light and Coke Company, London).
The discussion on the paper will be opened by Mrs. C. S. Peel, O.B.E., Director of Women's Service, Ministry of Food, 1917-1918.
4 45 Adjournment.

Wednesday, Oct. 3.

Public Conference.

In the Large Lecture Theatre, Midland Institute, Paradise Street (adjoining the Town Hall).

Subject: Gas in Industry.

10.30 Assembly.
10.45 Opening remarks by the President, Alderman J. H. Lloyd, M.A.

Papers.

1. "The Practical Advantages of Gas Service to the Manufacturer," by Mr. A. W. Smith (General Manager and Secretary, City of Birmingham Gas Department).
2. "Heat Treatment by Gas in Midland Industries," by Dr. C. M. Walter (Engineer in Charge of Industrial Research Laboratories, City of Birmingham Gas Department).
3. "The Use of Gas in the Boot and Shoe Industry," by Mr. Geo. S. Eunson (Engineer and Manager, Northampton Gas Light Company).

12.45 Adjournment.

1.0 Luncheon by the President-Elect, the Vice-Presidents, and Members of the Association to the President of the Association, the President of the National Gas Exhibition, and the City of Birmingham Gas Committee at the Conference Hall, National Gas Exhibition, Bingley Hall, Birmingham.

Public Conference.

In the Upper Annexe, National Gas Exhibition.

Subject: Gas in Catering.

2.30 Assembly.

2.45 Opening Remarks by the President, Alderman J. H. Lloyd, M.A.

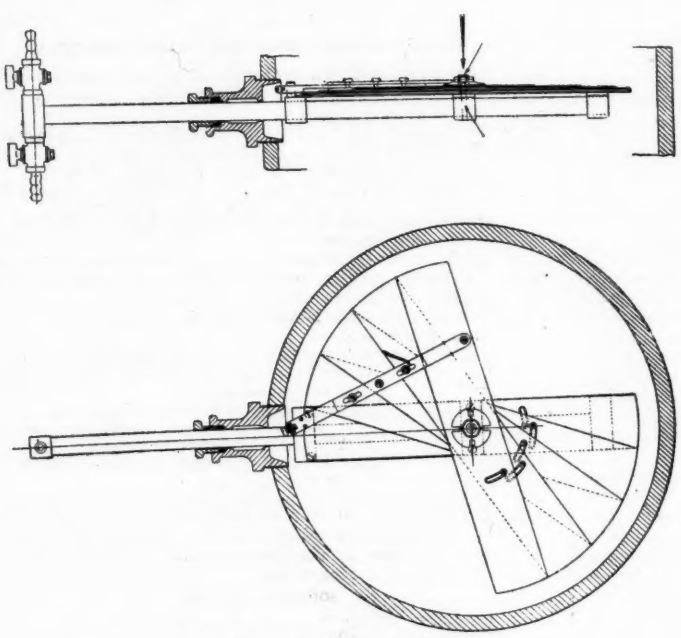
Papers.

1. "Gas for Catering and Canteens," by Mr. R. G. Marsh (Fittings Engineer, City of Birmingham Gas Department).
2. "Gas for Sugar Boiling and the Making of Confectionery," by Mr. W. B. M'Lusky (Engineer and Manager, Halifax Corporation Gas Department).
3. "Gas for Beer Boiling," by Mr. William Wilson (Engineer and Manager, Burton-upon-Trent Corporation Gas Department).
4. "Gas for Fish Frying (Wholesale and Retail)," by Mr. Harry Clark (Distribution Superintendent, Derby Gas Light and Coke Company).

CLOSE OF CONFERENCE.

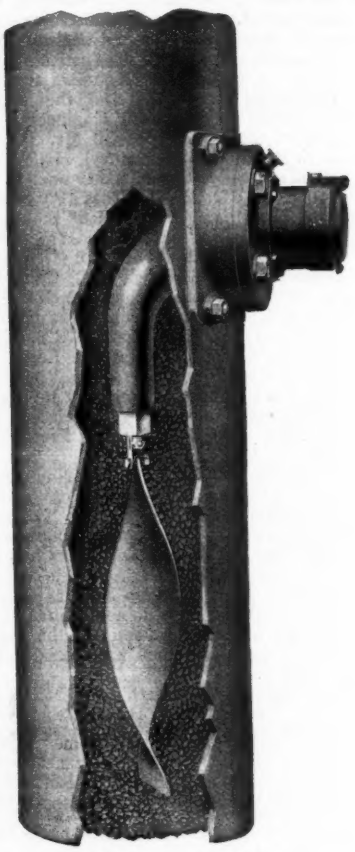
RECENT INTRIGUING INVENTIONS.

IN a brief outline of the Shipping Engineering and Machinery Exhibition (which is still attracting wide interest at Olympia) published in last week's "JOURNAL," reference was made to a new Pitot-tube device—one of the latest productions of Messrs. George Kent Limited. This ingenious contrivance will be exhibited at the stand of this firm at the forthcoming National Gas Exhibition at Birmingham; and further details will doubtless be welcomed. The expanding Pitot-tube has been devised to enable a workable difference of pressure to be obtained in the case of gas mains, where the velocity of gas is usually very low, without opening-up the main to insert an orifice or Venturi tube. On reference to the diagram, it will be seen that it consists of a stalk through which the difference of pressure is transmitted to a manometer or recording instrument, and that this stalk carries a series of plates arranged to be opened-out fan-wise after they have been inserted in the main. The size of these plates is such that they can be inserted through a hole tapped 2 in. or 2½ in. gas, and the drilling and tapping of this hole is, in fact, the only alteration to the main necessary for the insertion of the tube. The plates are usually designed to produce about 1-in. loss of pressure when spread out; and when the tube is not in use this pressure loss can be avoided either by withdrawing the tube or by rotating the stalk so that the plates lie parallel to the flow. The apparatus is so designed that one stalk can be used for a number of different-sized mains; separate sets of plates, which are inexpensive, being used for the various sizes. The appliance is suitable for use in conjunction with a curved-tube manometer or sensitive-type recorder.



The Kent Expanding Pitot-Tube Device.

Another invention of an admirable simplicity is the Kent coal meter, which is designed to measure the volume of coal or other granular material passing down through a vertical or sloping chute. The simplicity of the meter may be gathered from the accompanying illustration. It consists of a steel helix connected to a counter by means of a flexible shaft; the helix being suspended in the chute through which the material descends, and by its revolutions showing the volume passing. It is carried on a double swivel, which prevents any side strain on its shaft or bearing. The pull of the helix is taken by a double ball-bearing fully protected from dust by a number of compressed-felt washers. Provision is made to enable this bearing to be lubricated from outside. The meter is designed so that the helix and all working parts can be withdrawn from the chute for inspection at any time. The makers state that this simple device is capable of measuring the volume of material passing to within an accuracy of 2 or 3 p.ct., even when the sizes of individual lumps vary considerably. The weight can, of course, be obtained by multiplying the counter readings by the weight per unit volume. The meter is suitable for measuring any granular material, such as coal, broken coke, cement, &c. It is necessary that the material, whatever its nature, should fill the pipe and fall under its own weight.



The Kent Coal Meter.

Southern Association of Gas Engineers and Managers (Eastern District).—The next meeting of the Eastern District of the Association will take place at the Royal Fountain Hotel, Canterbury, on Wednesday, Sept. 19, at 2.30.

PROPOSED INSTITUTE FOR PUBLIC LIGHTING SUPERINTENDENTS.

From the correspondence that has been appearing in the Municipal Press for some time past, there appears to be a desire among those responsible for the lighting of public roads throughout the country for some form of Institution or Association of Lighting Superintendents or Inspectors, and those connected with the lighting industry, where they could foregather in conference and consider those questions which concern their calling in particular, and in general the subject of public lighting with a view to its betterment. From the correspondence it certainly seems there is much need of improvement in the lighting of public thoroughfares, especially on highways which are now crowded with fast-driven mechanically-propelled traffic. As a great deal of this traffic is on the roads at night time, there is need of good illumination, if the great toll of accidents and loss of life is to be avoided or lessened—especially in the country where the roads are both narrow and crooked, and only lighted in certain winter months.

Among those who are in favour of such an Institution, judging from their letters, are Mr. C. S. Shapley (Engineer and General Manager of the City of Leeds Gas Department), Mr. I. H. Massey (Distribution Superintendent, Oldham Corporation Gas Department), and Mr. Crane Cooper (Lighting Superintendent, Wakefield); while Mr. Davison (Lighting Superintendent, Newcastle-on-Tyne), Mr. G. K. Kerns, Mr. Leon Gaster (Hon. Secretary of the Illuminating Engineering Society), and Mr. W. J. Liberty (Lighting Superintendent, City of London) also contribute. So far the opinion seems in favour of a separate Institution; but it may be pointed out that there is a Joint Standing Committee in existence on this subject, and that the Institution of Gas Engineers are represented by Mr. R. Watson, of Doncaster.

THE ANGLO-AMERICAN YEAR BOOK.*

This book, published by the American Chamber of Commerce in London, is a residential, professional, and commercial directory of Americans and American business houses and their agents in Great Britain, and of British business houses and their agents in America; and as such it certainly serves its purpose. But it does more than this; for it would be difficult to find a time when there has been such understanding and harmony between the two Governments as exists to-day. Full of information of a most useful character—of a nature which, however, defies any attempt even to outline—it will be a companion and guide to all Americans in London, and a source of knowledge to those of this country whose interests are in any way connected with America.

One of the sections of the volume deals with English Law for Americans; and this will doubtless give much satisfaction, for it is compiled in a lucid manner by Mr. J. A. Barratt, K.C., of the English Bar and the U.S. Supreme Court Bar, and contains just the type of information calculated to be of practical assistance. The section concerned with British-American trade shows that our exports increased most largely in sheep and lambs' wool, iron and steel, cotton yarns and cotton piece goods (cotton goods not in the piece decreasing considerably), linen and jute piece goods, and paper; while the main decreases occurred in spun-silk yarn, jute yarn, jute sacks and bags, and scientific instruments. Two of the most striking features in the declared exports from London to the United States were the very heavy shipments of raw wools during the final three months of 1922, and the revival in the exports of raw diamonds, which totalled 97,152 carats, against 23,932 carats in 1921.

In a book of this description it was but natural to look for some reference to the American debt settlement; and in connection with this is given the statement voiced by the President of the National City Bank—that the British acceptance of the settlement of war debt was the most encouraging news that the business world had for long received, and that the importance of the step in constructive value to business could hardly be over-estimated. Already the Anglo-American Year Book has had a long and honourable history as the outward and visible sign of the Anglo-American relations in London; and no doubt it will find new and important fields of usefulness in its re-incarnation as an organ of the American Chamber of Commerce.

* "The Anglo-American Year Book," published by the American Chamber of Commerce in London, No. 8, Waterloo Place, Pall Mall, S.W. 1. Price 15s. net (4$).

American Gas Association.—The official notification of the fifth annual convention and exhibition of the American Gas Association, to be held in Atlantic City from Oct. 15 to 19, shows that a very full programme has been arranged. The attendance is expected to total from 3500 to 4000. In addition to the address of the President (Mr. R. B. Brown, of Milwaukee), a number of papers and reports will be submitted to the various sections, covering every vital issue confronting the industry; and apart from the business, ample entertainment will be provided for the visitors.

AMMONIACAL LIQUOR FOR SOFTENING WATER.

[From a Paper read by M. Chevalet at the Annual Meeting of the Société Technique de l'Industrie du Gaz en France.]

Realizing the ready demand of gas-works for pure water, not only in condensing and washing plant, but in steam-boilers, M. Chevalet was led to consider for the purpose a "home-made" softening agent—ammoniacal liquor. As a result he designed two plants, one for dealing with cold water, the other for application to a combined feed-water heater and softener invented by his father.

Passing rapidly over the disadvantages of using untreated water in gas-works apparatus—the rapid scaling-up of interior surfaces and grids, with reduced efficiency and increased maintenance costs—the author explains the chemistry of his process. If a small quantity of ammoniacal liquor is added to a volume of untreated water, sufficient to make an alkaline mixture, agitation will produce cloudiness, which proves to be precipitated carbonate of lime, previously in combination with the carbon dioxide in the water. The reaction is in practice far more complex, especially if the water is "permanently" hard, for equilibrium varies widely with the different salts present in the water and in the liquor; but broadly the experiment shows that the end is served, for an excess of ammonia produces no further precipitate, and the treated water will no longer impair the works' plant.

In practice, the ammoniacal liquor is run from a measured container into a receiver, where it mixes with service water from a valve controlled by a float in the main reaction vessel. From the receiver the mixture flows down a pipe and enters the reaction vessel near its base. A pair of grids with shavings between them serve to filter the outflow, which is metered and controllable. It has been objected that the supply of ammoniacal liquor is not theoretically controlled according to the throughput of water; but M. Chevalet says that it is sufficient to supply enough liquor for a maximum throughput, and work on this, because an excess is in no way harmful. A rough guide is to add a small amount of liquor after tests have shown that no free carbon dioxide remains in the water.

FEED-WATER TREATMENT.

Consideration was then given to the possibility of replacing carbonate of soda with ammoniacal liquor in the feed-water heater and softener; the problem being effected by the temperatures of working.

The principal reactions are as follows:

$$2NH_4OH + CaH_2(CO_3)_2 = CaCO_3 + (NH_4)_2CO_3 + 2H_2O$$

$$(NH_4)_2Co_3 + CaH_2(CO_3)_2 = CaCO_3 + 2NH_4HCO_3$$

At about 60° C., however, the bicarbonate and the carbonate of ammonia are broken up—

$$2NH_4HCO_3 = (NH_4)_2CO_3 + CO_2 + H_2O$$

$$(NH_4)_2CO_3 + H_2O = CO_2 + 2NH_4OH;$$

the ammonia thus reappearing and being available for the precipitation of further carbonate of lime. Where carbonate of soda is employed, this further reaction takes place at a higher temperature, only reached inside the boiler. Ammoniacal liquor may therefore be said to work as a catalytic agent; a very small quantity serving for an indefinite period.

The process with which the author has combined this use of ammoniacal liquor includes the repeated agitation by steam of the feed water as it flows over trays; and he points out that the ammonia, having achieved its purpose in one tray, is carried on to the next by the steam, and so on. He refers particularly to a preheater-purifier attached to a boiler evaporating 500 litres an hour. The five trays of the apparatus were 40 cm. in diameter; and it communicated with a separate feed-water settling-tank of 4 cub.m. capacity. The supply water was admitted to the plant under control of a float in the settling-tank; and ammoniacal liquor was admitted drop by drop at the rate of about 50 litres in 24 hours. Four months' continuous working produced an insignificant deposit in the tank. A sufficient test was to take a sample from the outlet of the softener, and add an excess of liquor; absence of precipitate being an ample safeguard.

M. Chevalet is of opinion that the combination of ammoniacal liquor and heat presents a system of feed-water treatment which is not costly, is extremely simple of control from the chemical point of view, and enables one to use plant of far smaller dimensions than when heat alone is employed. The small quantity of chlorides introduced with the liquor is certainly not more considerable than that resulting from the use of cleaning agents with a base of barium chloride.

In short, the author considers that ammoniacal liquor may replace carbonate of soda in any process which employs the latter reagent, and that a considerable saving of outlay may thereby be effected.

Scottish Juniors and the Education Scheme.—There is to be an extraordinary joint meeting of the Eastern and Western Districts of the Scottish Junior Gas Association in the Cadoro Restaurant, Union Street, Glasgow, next Saturday afternoon, at 3 o'clock, when Mr. Walter Hole will give an address on the education scheme of the Institution of Gas Engineers. The meeting is open to all interested in the gas industry.

THE SYDNEY GASHOLDER.

A Comparison with the Six-Lift Holder at East Greenwich.

In a recent number of "Das Gas- und Wasserfach," M. Niemann, of Dessau, presented under this title some interesting material illustrating German views on large gasholders.

The fact that a 12½-million c.ft. holder has just been erected in Sydney is, he says, a sign of confidence in considerable expansion of gas consumption for some years to come. That the construction of the new holder does not conform more nearly to the holder erected at East Greenwich in 1892 by Livesey, which, with its 12·2 million c.ft., is almost equal in capacity, gives the author cause for wonder why England, long justly renowned for large holders, has not achieved anything like a standard or uniformity in their construction. When it is seen that the height of the convex tops is equal in each case (25 ft.), and how nearly equal are the diameters of the top lifts (Sydney 287 ft. 11 in., Greenwich 287 ft. 6 in.), and also the total heights of the holders when fully expanded, it might appear at first sight that there is some approach to standardization.

But this idea is soon exploded. For instance, the top curb in Sydney shows quite a different type of construction, and the whole circumference (with 300-ft. tank diameter) is divided into 34 bays, against only 32 in the Greenwich holder (304 ft. 3 in. tank diameter).

A comparison of published diagrams of the holders conveys the impression that the Sydney holder, with its guide framing reaching to the full height of the expanded holder, is of much stronger construction than the other. The builders guaranteed that they made their choice of design after very careful examination of all previous experience, and with special regard to the exceptionally heavy storms encountered in the neighbourhood of Sydney; so that it is safe to assume exceptional security in the new holder. It is easy to understand why six lifts were not introduced, since in the East Greenwich case only five had originally been intended; the sixth being added because a shallower tank than had originally been designed was necessitated by local water-pressure conditions. The continuation of the framework to the full height, instead of the projection beyond it of some of the lifts—as in the case of East Greenwich—seems a costly, and perhaps excessive, precaution; and one which, moreover, is apt to lead to an over-estimate of the strength of the structure. The oblique guide rollers of the Greenwich holder might, too, have been expected in the new construction, since they mean a saving in the height of the framework, and a very efficient hold of the rollers on the guides.

Taking everything into consideration, it is very interesting to compare, in a general way, the relative resistances of the two—the new construction at Sydney, with its heavy foundation anchorage, and six horizontal rings of girders, and the older lightly-anchored Greenwich holder, with its one single-girder ring. The result on first blush is found to be surprisingly favourable to the latter.

The principal measurements of the two holders are tabulated for comparison as follows:

	East Greenwich.		Sydney.	
	Ft. In.	Metres.	Ft. In.	Metres.
Tank diameter	304 3	92·73	300 0	91·44
Outer lift diameter	300 0	91·44	297 0	90·52
Inner lift diameter	287 6	87·63	287 11	87·76
Depths of lifts	31 to 32	9·45 to 9·75	46 to 46·6	14·02 to 14·20
Depths of cups	21 in.	0·53	24 in.	0·61
Height of guide framing to lower edge of top girder	124 0	37·79	182 0	57·47
Distance of centre of top roller above top curb of inner lift	3 10	1·17	6 1	1·91
Cross-bracing zones:				
Breadth	30 0	9·14	29 0	8·84
Height	24 0	7·31	29 0	8·84
Number of standards	32		34	
Moment of wind pressure at 100 kg. per sq. metre	40,453 ft.-tons	13,100 metre-tons	39,835 ft.-tons	12,900 metre-tons

In the Greenwich holder there are five series of cross-bracing each consisting of two flat bars and one angle-iron bar. At the bottom their measurements are 12 in. by ⅜ in. and 12 in. by ½ in., with 3 in. by 3 in. by ½ in. angles. They taper towards the top to 8 in. by ⅝ in. and 10 in. by ½ in., with the same angles. The inclination gives a height of 24 ft. and width of 30 ft. in each zone, so that the resultant stress in the horizontal direction is 0·78 of the unit. Imagine that the horizontal stresses due to the cross-bracing work at their respective heights above the tank top so as to produce a statical moment, which works directly against the moment of the wind pressure. Imagine also that the sum of the moments due to the diagonals which cut each of two directly opposite standards has to take up the total moment of wind pressure. Visualize each diagonal involved with 1000 kilos. (1 metric ton) per sq. cm. [about 6·35 tons per sq. in.], so that the number of tons is the same as the number of sq. cm. of their cross-section. From this we have the following values:

Diagonals.			Horizontal Stress (0·78). Tons (Metric).	Height.		Moment. Metre-Tons.
No.	Sq. Cm.	Sq. In.		Metres.	Ft.	
1	84	13·02	66	36·8	24	2429
2	91	14·11	71	29·5	48	2095
3	95	14·73	74	22·2	72	1643
4	103	15·97	80	14·9	96	1192
5	106	16·43	83	7·6	120	631

[The metric ton = 0·9842 of one English ton.] Total . . 7990 = 24,673 ft.-tons.

Therefore, at a pressure of 1000 kilos. per sq. cm., two diametrically opposite standards with their five cross-braces each can take up 2 × 7990 = 15,978 metre-tons [49,346 foot-tons]. As the wind pressure only gives rise to 13,100 metre-tons [40,453 foot-tons], the tension works out at only 1000 × 13,100 ÷ 15,978 = 819 kilos. per sq. cm. [11,649 lbs. per sq. in.]. As only 2 × 5 = 10 diagonals are being considered as involved, it is only the continuation of these downwards to the tank rim and upwards to the top girder the effect of which is being estimated—that is to say, only 5 × 10 = 50 zones, out of a total of 32 × 5 = 160. This means that there are 110 in reserve. These are, of course, less favourably situated than those which we have considered, which occupy five-thirty-seconds of the holder's diameter on each side, and of which, therefore, those situated farthest away are inclined to the direction of the wind at an angle of only about 56°.

At the top of the standards is situated the only horizontal girder. Let us imagine first that it is fixed only to the two standards we have considered, and thus it has to withstand the full moment of wind pressure with its attachments to the standards. As the horizontal girder is 37 metres above the tank coping, the moment of the wind pressure exercises a force of 13,100 ÷ 37 = 354 tons, or half of this on each side, *i.e.*, 177 tons. This force is opposed by a cross-section of 248 sq. cm. [38 sq. in.] (24 in. × ⅜ in. + 22 in. × ½ in. + 4 × 6 in. × 3 in. × ½ in.), so that a tension of 1000 × 177 ÷ 248 = 714 kilos. per sq. cm. [10,155 lbs. per sq. in.] is involved. As the horizontal girder is fixed not only to the two, but to the whole 32 standards, the effect upon it of the wind must certainly be carried obliquely downwards by the diagonal stays to the tank top. There is, consequently, through the diagonal bracing, a connection under strain between the massive top ring and the top of the tank, which can be regarded as a rigid foundation. The standards have only to bear insignificant lateral forces and the weight of the framework itself. For this reason, they have been left at the bottom without foundation plates of any size, and anchored in a simple manner.

Turning to the Sydney holder, this has six belts of diagonal bracing, so that the resistance offered by 2 × 6 = 12 cross-braces on two standards has to be considered. The inclination is 45°, giving height and breadth of 29 ft. each, which makes the horizontal stress 0·707 of the unit. The cross-bracing consists in this case of round steel bars with strengthened couplings and right and left hand screwed coupling boxes.

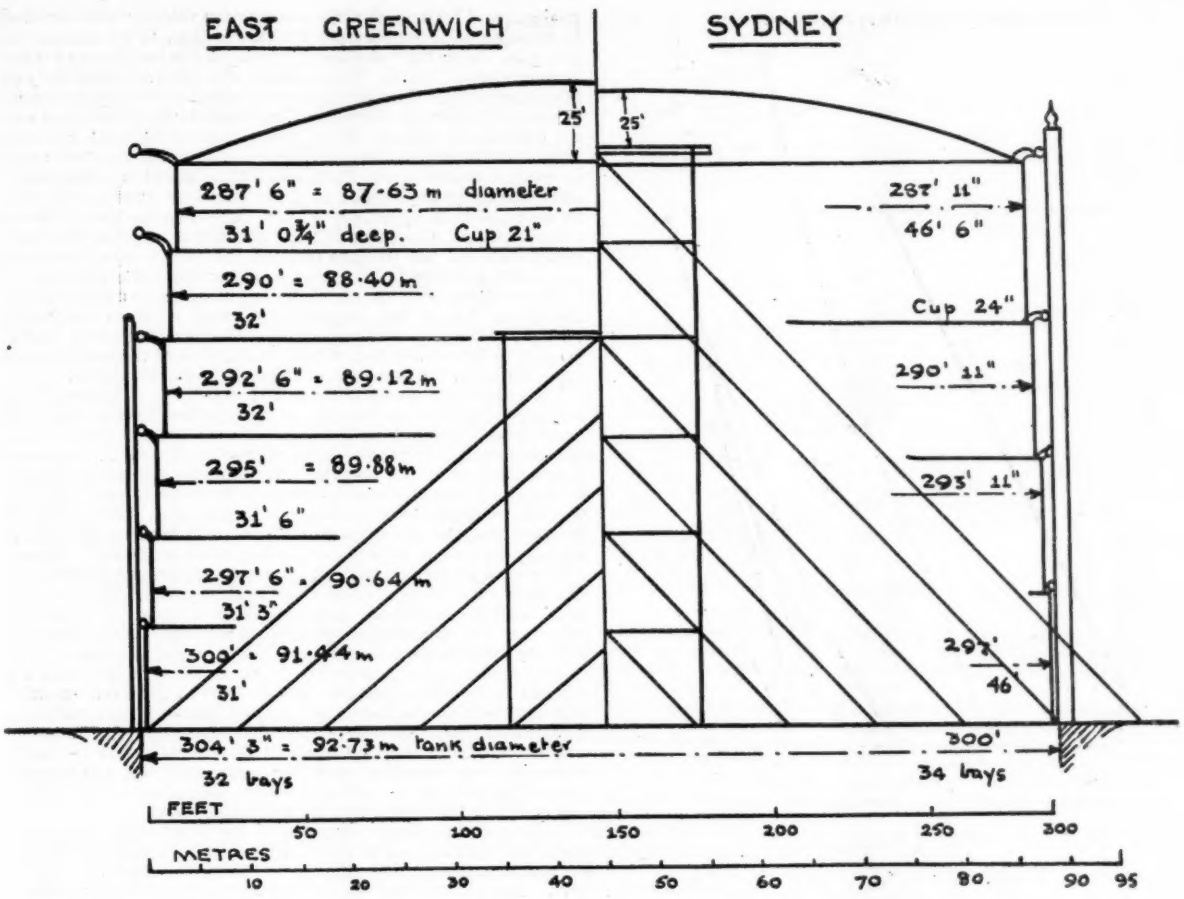
The following are the values obtained for the Sydney holder for comparison with those already tabulated for East Greenwich, by assuming one ton (metric) per sq. cm. [6·35 tons per sq. in.]:

No.	Diagonals.			Horizontal Stress (0·707). Tons (Metric).	Height.		Moment Metric Tons.
	Diameter In.	Sq. Cm.	Sq. In.		Metres.	Ft.	
1	1⅛	11·3	1·75	8 0	54·74	174	438
2	1⅛	17·8	2·76	12·6	45·69	145	576
3	1⅛	22·8	3·53	16·1	36·65	116	590
4	1⅛	28·6	4·43	20·2	27·61	87	558
5	1⅛	34·8	5·39	24·6	18·57	58	457
6	1⅛	41·8	6·48	29·5	9·53	29	281

Total 2900 = 8955 ft.-tons (see previous table).

The two diametrically opposite standards with the six sets of diagonals fixed to each can counteract, therefore, only 2 × 2900 = 5800 metre-tons [17,910 ft.-tons]—that is to say, only 0·45 of the total moment of wind-pressure of 12,900 metre-tons [39,835 ft.-tons]. For this, only 2 × 6 × 6 = 72 of the available 34 × 6 = 204 diagonal zones come into play, thus leaving 132 in reserve. The 72 cover six thirty-fourths of the total circumference, and so are situated variously up to 63° obliquely to the direction of the wind.

The top ring of girders (lattice 4 ft. high, 3 ft. broad) offers, in four angles of 5 in. by 4 in. by ½ in., only 4 × 29 = 116 sq.cm. [17·98 sq. in.] cross-section. The amount of wind pressure at the height of the middle of the girder (about 55 metres = 180 ft.) would amount to 12,900 ÷ 55 = 235 tons, so that each side of it would have to receive half of this—*i.e.*, 117·5 tons. The available 116 sq. cm. would therefore be involved with 1013 kilos. per sq. cm. [14,407 lbs. per sq. in.]. The foundation anchorage by means of four holding-down bolts of 2¾ in. diameter, specially reinforced, arranged at 6 ft. 3 in. centres measured in a radial direction from the tank, and 4 ft. 7½ in. centres transversely, gives, at 1000 kilos. per sq. cm. [14,223 lbs. per sq. in.] and a height of about 2 metres, a moment of about 2 × 2 × 38 = 152 metre-tons [469 ft.-tons].



In the transverse direction, with the bolts at about 1·4 metres distance, the value is less. Of the moment of wind-pressure of 12,900 metre-tons [39,835 ft.-tons], these 152 metre-tons represent only one eighty-fifth, and are therefore of little consequence. It is the same with the stiffness which is imparted to the framework by the rigid connection between the horizontal girders and the standards. There are 2 × 5 box-plate attachments about 1 ft. deep [305 mm.], whose moments of flexion amount to 2 × 5 × 5·3 = 53 metre-tons, or 1/243 of the moment of wind pressure. The top lattice girder of 4 ft. [1·22 metre] height with its four angles of 5 in. by 4 in. by ½ in. represents a moment of flexion of only 2 × 29 × 1·22 ÷ 2 = 35 metre-tons, or only 1/364 of the moment of wind-pressure. The sum of these moments—152 + 53 + 35 = 240 metre-tons [741 ft.-tons] would have to be multiplied by 54 to be able alone to sustain the full moment of wind pressure. As there are only 34 standards in all, it follows that the structure would be much too weak without the diagonal bracing. Deducting from 12,900 the 5800 metre-tons estimated for the cross-bracing, it leaves 7100 metre-tons (29·5 × 240) to be accounted-for out of the total effect of the standards and the foundation anchorage.

It would lead too far, states the author in conclusion, if the comparison were carried into greater detail. His object has been to present a reasoned judgment as to whether the East Greenwich holder of 1892, with its somewhat light and "airy" appearance, and its low cost, really offers sufficient strength, and whether the much stronger looking Sydney erection has been built unduly strong. His conclusion is that in reality the frail appearance of the former conceals a great power of resistance, and that its method of construction has a great deal to recommend it when low initial cost but strength are required, as they were in 1892, and as they always must be in the struggle with competitors.

FACTORS INFLUENCING THE YIELD OF AMMONIA IN THE CARBONIZATION OF COAL.

PART II.*—DISSOCIATION, THE INFLUENCE OF WATER VAPOUR AND THE CHARACTER OF THE CONTACT MATERIALS.

By R. A. MOTT, M.Sc., and H. J. HODSMAN, M.B.E., M.Sc., F.I.C., Department of Coal Gas and Fuel Industries, Leeds University.

[A Paper read before the Yorkshire Section, Society of Chemical Industry, on Nov. 20, 1922—reproduced from the Society's "Journal."]

(*Concluded from p.* 580.)

EXPERIMENTS ON THE DISSOCIATION OF AMMONIA IN CONTACT WITH FUSED SILICA.

The experiments of Greenwood and Hodsman with fused silica chips were repeated, but at temperatures above 800° C., using a coal gas free from oxygen in a fused-silica reaction tube, with at first confirmatory results; but on repetition the loss of ammonia was considerably reduced. Thus experiments at 900° C. gave at first 30 p.ct. dissociation; and in succeeding experiments much lower figures were obtained (Table VI., p. 578). The explanation was apparent when the tube was emptied and the fragments of silica found to be thickly covered with a layer of sooty carbon. At the high reaction temperature, decomposition of the hydrocarbons of the coal gas had evidently taken place in the reaction tube, with deposition of carbon. Carbon has been shown (Carpenter and Linder) to be inactive; and even at 1000° C. with thirty seconds' time of contact (calculated at 500° C.) little decomposition of ammonia was found. The decrease in activity of the contact material was due to the covering of the relatively inert silica with the still more inert carbon.

DISSOCIATION IN CONTACT WITH COKE.

Coke (A) was prepared from coal from Blackwell Colliery, Derbyshire, at 800° C. Analysis showed: Carbon 85·10 p.ct., hydrogen 1·05 p.ct., nitrogen 1·60 p.ct., sulphur 2·40 p.ct., ash 9·65 p.ct., moisture 0·20 p.ct. Analysis of the coke ash gave the following figures: Loss on ignition 1·20 p.ct., silica 38·4 p.ct., alumina 28·0 p.ct., ferric oxide 19·6 p.ct., lime 7·5 p.ct., magnesia trace, sulphuric acid (SO_3) 2·2 p.ct. The coke was ground to pass a ¼ in. mesh and remain on a ⅛-in. mesh, and was packed into the fused-silica reaction tube.

EXPERIMENTS IN COAL GAS.

The experiments (Table VII., fig. 5) in a coal-gas atmosphere containing oxygen show that this coke is generally a less active catalyst than the "chattered" brick, only 29 p.ct. of ammonia being decomposed at 800° C.; and the temperature coefficient is also less. The dissociation first begins to be appreciable about the same temperature (650° C.); but complete dissociation is not attained until about 850° C. To check the results at higher temperatures, blank experiments were performed in the absence of ammonia by passing coal gas through the reaction tube and absorbing any ammonia liberated by the action of coal gas on the nitrogen of the coke. At 850° C. in coal gas, 0·6 c.c. of ammonia was liberated, involving in an experiment at 850° C. a

* Part I. was reproduced in Vol. CLIX. of the "JOURNAL," pp. 527, 595.

Decomposition of ammonia in contact with coke.

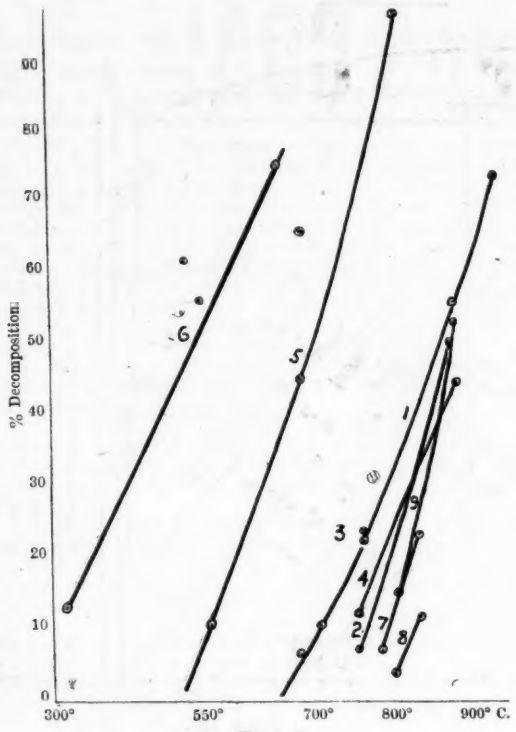


Fig. 5.

Coke (A).

1. In coal gas (*a*) (0·5 p.ct. O_2).
2. ,, ,, (*b*) (1·0 p.ct. O_2).
3. ,, ,, (*b*) (O_2-free).
4. In hydrogen (O_2-free).
5. In nitrogen (O_2-free).
6. ,, ,, (1·2 p.ct. O_2).

Coke (B).

7. In coal gas (*c*) (2·2 p.ct. O_2).
8. In hydrogen (O_2-free).
9. In coal gas (*b*) (O_2-free).

correction of + 3 p.ct. At 800° C. only a trace of ammonia was liberated. A blank experiment was not made at 900° C., but a correction of 4 p.ct. decomposition was made in drawing the curve.

In order to study its effect on the reaction, the oxygen was removed from a new sample of coal gas (oxygen = 1·0 p.ct.) as before, and experiments at 750° and 850° C. tried. The results (Table VII., fig. 5, curves 1 and 3) were identical with those found for the previous coal gas, which contained about 0·5 p.ct. of oxygen. When the new coal gas was used without removing the oxygen, much lower results were obtained (fig. 5, curve 2). The inhibitory effect was more marked at the lower temperature.

Dissociation of Ammonia in an Atmosphere of Hydrogen.

Experiments were made using hydrogen free from oxygen in place of coal gas. The results are given in Table VIII. (*a*), fig. 5, and show a less extensive decomposition than in coal gas, as was expected.

Dissociation of Ammonia in an Atmosphere of Nitrogen.

The results are given in Table VIII. (*b*), fig. 5. The curve for nitrogen free from oxygen is almost parallel to the curves for coal gas and hydrogen; the same reaction velocity being attained in nitrogen at a temperature 150° lower than in an oxygen-free coal gas. With the "chattered" firebrick the temperature difference was about 120° C. The ammonia was not quite completely decomposed at 750° C., a temperature at which only incipient decomposition in hydrogen occurred. Experiments with moist gases were not performed because of the gasification of the coke by steam with liberation of ammonia. It may be assumed that, with coke as contact material, the inhibitory action would be operative if complicated by gasification of the coke. Some confirmation is to be obtained from experiments by S. Pexton on the gasification of coke in steam. On increasing the quantity of steam so that more steam survived the passage through the coke, it was found that more of the nitrogen of the coke was recovered as ammonia.

Experiments with air were impossible, owing to gasification of the coke; but a few experiments using nitrogen containing 1·2 p.ct. of oxygen were performed. This is sufficient to oxidize 1·6 p.ct. of ammonia; hence little gasification of the coke may be expected when the ammonia content of the gas is normal.

The results are given in Table VIII.(*c*), fig. 5. The results are not in good agreement, oxygen in the mixture having given experimental difficulties on other occasions; but the curve shows that oxidation may take place at slightly above 300° C., the lowest temperature at which oxidation of ammonia has been observed by us, and decomposition by oxidation is extensive before decomposition by dissociation (curve 5) is appreciable. This supports the view that the decomposition of ammonia in nitrogen containing only a small amount of oxygen is due to oxidation. Experiments were performed with another coke (B) prepared from New Hucknall coal at 850° C., in both a glass and a silica reaction tube; and the results are given in Table IX., fig. 5. It will be seen that the dissociation in contact with this coke is less than with the Blackwell coke. At 800° C. in dry coal gas, only 17 p.ct. is decomposed (compared with 37 p.ct.). The temperature coefficient is, however, greater; and at 850° C. the decomposition with the two cokes is the same. In hydrogen the decomposition is markedly less, and only 4 p.ct. decomposition was found at 800° C. Unfortunately no analysis of this coke and its ash is available; but Foxwell's results on cokes with ash composition varied by addition of different oxides suggests an explanation, and points to the importance of ash composition.

Coals containing large amounts of free iron oxide in the ash might be expected to give reduced yields of ammonia in carbonizing practice, though it is difficult to verify this through lack of data. Since it has been shown that carbon is a very indifferent contact substance, the quantity and quality of the ash in coal and coke seem likely to have great influence on yields of ammonia.

Summary and Conclusions.

A study has been made of the destruction of ammonia at temperatures and partial pressures, and in presence of materials occurring in carbonizing practice. The influence of atmospheres of coal gas, hydrogen, and nitrogen was examined, and also the influence of water vapour and oxygen when present.

A firebrick material "chattered" by the attack of salt vapours in a coke-oven, proved an active catalyst. In a coal-gas atmosphere, ammonia was measurably dissociated into its elements at 650° C., and the velocity increased rapidly with rise of temperature. Water vapour exercised on the reaction an inhibitory effect which showed no falling off when the proportion of water was increased. At 850° C. dissociation was completely arrested when less than 25 p.ct. of water vapour was present in the mixture. The presence of oxygen in practice may promote ammonia losses by causing local heating; the reactions being very sensitive to temperature. In these experiments, where temperatures were carefully controlled, the presence of a small proportion of oxygen retarded the dissociation of ammonia, probably owing to preferential union with hydrogen present to form water vapour; and this has been shown to have an inhibitory effect. In an atmosphere of hydrogen, the phenomena were similar, but the dissociation was usually less extensive. In nitrogen the decomposition of ammonia occurred much more readily, being perceptible at 500° and complete at 660° C.

TABLE VII.—*Experiments Made with Coke* (A) *Made at 800° to 850° C. Dissociation of Ammonia in Coal Gas* (*Oxygen = 0·5 P.Ct.*)

Temperature °C.	Rate of Flow (Litres per Hour).	Time of Contact, Seconds (Calculated to 500° C.).	P.Ct. NH_3 Entering.	P.Ct. NH_3 Leaving.	P.Ct. NH_3 Dissociated.	P.Ct. NH_3 Dissociated Calculated to Same Time of Contact.	Remarks.
675	3·97	6·35	1·53	1·46	5	6·5	
700	3·93	6·4	1·55	1·42	9	10	
750	3·92	6·45	1·455	1·135	22	22·5	
800	3·93	6·4	1·70	1·32	28	29	Escape of gas makes result doubtful.
800	3·94	6·4	0·05	0·06	..	..	Blank on liberation of ammonia from coke.
850	4·07	6·2	1·48	0·76	51	54	Correction applied for ammonia liberated.
850	3·85	6·55	0·00	0·04	..	..	Blank on ammonia liberated from coke.
905	4·17	6·05	1·18	0·39	68	72·5	
				Different coal gas.			
750	4·04	6·25	1·38	1·09	21	23·5	Oxygen-free.
750	3·96	6·45	1·52	1·43	6	6·5	1·0 p.ct. oxygen entering.
850	3·98	6·35	1·565	0·81	51	52·5	Oxygen-free. Correction applied for ammonia liberated.
850	4·08	6·15	1·625	0·92	46	49·5	1·0 p.ct. oxygen entering. Correction applied for ammonia liberated.

TABLE VIII.—*Experiments with Coke* (A).

Temperature °C.	Rate of Flow (Litres per Hour).	Time of Contact at 500° C.	P.Ct. NH_3 Entering.	P.Ct. NH_3 Leaving.	P.Ct. NH_3 Decomposed.	P.Ct. NH_3 Decomposed Calculated to same Time of Contact	Remarks.
			(*a*) Dissociation of ammonia in hydrogen (oxygen free).				
750	3·87	6·5	1·715	1 51	12	12	
850	4 02	6·25	0·065	0·09	..	..	Blank on liberation of ammonia from coke
850	4 23	5·95	1·61	1·015	38·5	44·4	No HCN detected in products
			(*b*) Dissociation of ammonia in nitrogen (oxygen free).				
550	3·91	6·45	1·62	1·48	8.5	9	
650	3·46	7·3	1·905	0·925	51·5	43·5	
755	4·00	6·3	1·53	0·14	91·0	93	
			(*c*) Decomposition of ammonia in nitrogen (1·2 p.ct. oxygen entering).				
						Oxygen leaving.	
640	3·84	6·55	1 615	0·595	63	0·25	O_2 used = 75 p.ct. oxidation H_2O formed = 52 ,, ,,
510	3·84	6 55	1·56	0·73	53*	0 60	O_2 used = 80 ,, ,, H_2O formed = 53 ,, ,,
355	3·76	6·7	1·485	1·315	9	0·90	O_2 used = 25 ,, ,, H_2O formed = 7 ,, ,,
485	3·75	6·7	1·47	0·675	58·5	0·40	O_2 used = 70 ,, ,, H_2O formed not estimated
605	3·87	6·5	1·165	0·325	72	0·30	O_2 used = 100 p.ct. oxidation H_2O formed = 95 ,, ,,

* N_2O_3 absent.

N.B.—Oxygen used in series (*c*) is always greater than required for oxidation of ammonia, which points to a little gasification of the coke.

TABLE IX.—*Experiments with Coke* (B) *made at* 850° C.

Temp. °C.	Rate of Flow (Litres per Hour).	Time of Contact Seconds (Calculated to 500° C.).	P.Ct. NH_3 Entering.	P.Ct. NH_3 Leaving.	P.Ct. NH_3 Dissociated.	Remarks.
			Dissociation of ammonia in coal gas (2·2 *p.ct. oxygen*).			
775	3·72	10·4	1·605	1·51	6·5	Moist gases.
770	3·78	10·3	1·455	1·35	6·5	,, ,,
780	4·00	9·7	1·43	1·35	6·0	,, ,,
820	3·59	10·8	1·54	1·17	23	,, ,,
795	3·70	10·5	1·525	1·26	17	Dry ,,
			Dissociation of ammonia in hydrogen.			
800	4·75	8·2	1 425	1·37	4	Dry gases, oxygen removed.
835	3·57	10·9	1·55	1·35	13	Dry gases.
			Later experiments in silica reaction tube.			
			Dissociation of ammonia in coal gas (*oxygen free*).			
800	3·60	6·55	1·355	1·13	16·5	Dry gases.
800	3·72	6·35	0·925	0·785	15	,, ,,
850	3·78	6 25	1·79	0·85	52·5	,, ,,
850	3·77	6·3	1·465	0 67	54	,, ,,

The catalytic activity of brick material apparently depended largely on the proportion and condition of the iron present. The iron present in a normal well-burned brick containing about 1·5 p.ct. of Fe_2O_3 may not be very active; but after long use, especially where salty coals are carbonized and iron has been deposited in the pores of the material, the latter seems to acquire a much-increased activity

Fused silica, and especially carbon arising from the decomposition of hydrocarbons, were contact materials with low activity.

Where coke was used as contact material, the effect of atmosphere on the destruction of ammonia resembled that observed with the "chattered" firebrick. Since carbon is a relatively inert material, it is probable that the quality and quantity of the ash exercise an important influence.

Discussion.

Prof. J. W. COBB said that in the present research the much-debated question of water vapour had received elucidation which it was not easy to obtain from experiments conducted on the large scale, owing to complications from temperature and other variations.

Mr. C. P. FINN asked, assuming Foxwell's theory of the "path of travel" to be correct, if the authors had any idea of the extent of the loss of ammonia by contact with old brick material. Iron was not of necessity present in coke as oxide, and investigation would be necessary to decide the state in which iron existed in coke.

Mr. MOTT said that it was generally admitted that old walls caused loss of ammonia, though this had usually been attributed to leakage. According to Foxwell's theory there was the greatest possibility of gas passing alongside the oven walls during the first ten hours, when the coal near the oven walls was being carbonized, and the pressure of steam from the water evaporated from the centre of the charge prevented the gas from passing up the cool interior. Purves ("Trans. Inst. Gas Eng.," 1914) had shown that the percentage of ammonia in gases leaving the oven was relatively small at the beginning of the coking period, increasing as the water was evaporated. So it was probable that old bricks accounted for some loss of ammonia by catalytic dissociation, though a direct experiment on an old oven would be desirable to settle the extent of the loss.

Mr. W. M'D. MACKEY said that the fact that the yield of ammonia decreased as the oven became older was generally put down to leakage through the walls. The influence of iron as a factor in the destruction of ammonia in the oven had not occurred to him; but the paper amply proved this, and it was now a question of the extent of loss in practice. If the loss of ammonia proved serious, could the deposited iron or oxide be periodically "whitewashed" over with some material suitable to prevent the action?

Mr. MOTT said this might be approached by using different types of walls. It was becoming a more popular practice to use a silica wall.

A MEMBER asked if it were possible that ammonia was formed during the process by the direct combination of hydrogen and nitrogen.

Mr. HODSMAN said it had been suggested, but there was no evidence that any measure of the combination of free hydrogen and nitrogen occurred during carbonization.

Prof. COBB said the method of formation was, of course, not by direct combination of free nitrogen and hydrogen.

Mr. GAWLER asked what distinction had been drawn between the terms "dissociation" and "decomposition."

Mr. HODSMAN replied that they had reserved the word "dissociation" for the reaction in which ammonia broke-down directly into its elements. The ammonia sometimes could be destroyed otherwise, as by oxidation, and they had used the word "decomposition" to mean the destruction of ammonia in general.

Mr. W. ROBERTSON said that one very striking result was that the decomposition took place to a greater extent in the presence of nitrogen than in that of hydrogen or coal gas. This could be explained by a surface effect of the catalyst—the catalyst having a hydrogen film, whereas the nitrogen might possess little attraction for the catalyst. In order to distinguish between the decomposition which took place in the absence of oxygen, he suggested that it be termed the "dehydrogenation" of ammonia, and where there was an oxygen effect simply to call that the decomposition.

Mr. HODSMAN agreed that the facts were to be explained in some such way, the gases coming together on the surface reacting to form products which passed away again. If other gases were present—such as water vapour or hydrogen sulphide—they might obstruct access of reagents to the surface; and, of course, the excess of hydrogen or nitrogen might operate in a similar way, though differing in degree.

Dr. FOSTER asked if the authors had taken into consideration any other catalyst besides ferric oxide. The difference between 1·5 p.ct. and 3 9 p.ct. of ferric oxide in respective bricks was not great, yet there was a marked difference in the results.

Mr. HODSMAN said it was true that the oxide of iron formed a very small proportion of a refractory material, but the major constituents were relatively inactive contact materials.

MANCHESTER AND DISTRICT JUNIORS.

Annual Picnic.

Members of the Association, accompanied by their ladies, had their annual picnic on Saturday last, the place chosen being Chester. The party assembled at Northgate Station, and from there went down to the River Dee, taking a boat up the river to Eccleston Ferry for tea. Subsequently the party journeyed through the grounds adjoining Eaton Hall, returning to the Ferry in time for the return boat to Chester. The weather was delightful, and all were pleased with the outing.

This was the second occasion on which the ladies have been invited; and the innovation has proved such a decided success that it will in future doubtless become an annual event. The ladies appreciate the picnic, and are deeply interested in the work of the members. The Council feel that it is only fair that the ladies should have some acquaintance with the members who meet month by month while they are at home. Those members who have not as yet taken part in these Ladies' Days should make a special point of so doing on future occasions, as there is no doubt that the ladies can help them to take an added interest in their daily labours, when they are brought in close contact with others, all of whom are interested in the same subject—gas.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING IN STIRLING—THURSDAY, SEPT. 6.

THE Annual Meeting of the North British Association of Gas Managers was held on Thursday last in the Albert Hall, Stirling. Mr. JOHN M. SMITH, of Stirling, the President of the Association, occupied the chair, and he was supported at the outset by Mr. Forsyth, the Chairman of the Stirling Gas Light Company, Mr. J. W. M'Lusky (Glasgow), Mr. John Wilson (Motherwell), and Mr. David Fulton (Helensburgh), the Secretary and Treasurer of the Association. The attendance was regarded as a record one; there being 180 members present.

INTRODUCTORY REMARKS.

The PRESIDENT said that before they proceeded to deal with the business before them on this occasion, he would call upon Mr. Forsyth, the Chairman of the Stirling Gas Light Company, to offer a few remarks.

Mr. FORSYTH, who was cordially received, said it afforded him very great pleasure to meet the members of the North British Association of Gas Managers; and in the name of the Directors of the Stirling Gas Light Company, he had to extend to them a cordial welcome. He thanked them for the honour they had done to Stirling in making it the venue of their annual meeting. They in Stirling felt highly honoured and complimented. Then he desired also to thank them for the honour they had paid to Mr. John M. Smith, the Manager and Engineer of the Stirling Gas Light Company. Mr. Smith's services were highly appreciated by the Directors, who were glad to find that their appreciation had been endorsed by a body much more competent to judge of his abilities than business men were. He felt sure that in selecting Mr. Smith as their President, he would not disappoint them. He (Mr. Forsyth) hoped the members of the Association would enjoy themselves in Stirling. Those of them who had historical tastes would have an opportunity of seeing the town's prehistoric rock and castle. In their deliberations that day, he hoped they would keep the practical side well in the forefront, and not advance too far into the region of theory and speculation. Personally he took the view that the most successful gas manager was the individual who wedded theory and speculation—or research—to the practical side, and was able to produce a good article at a reasonable price. He felt this was a view which was shared by producers as well as consumers.

On the call of the PRESIDENT, a hearty vote of thanks was passed to Mr. Forsyth, who then withdrew from the meeting.

APOLOGIES FOR ABSENCE.

The minutes of the last annual meeting were read, and unanimously approved. Thereafter apologies for absence were noted from several gentlemen.

THE COUNCIL'S ANNUAL REPORT.

The PRESIDENT remarked that the annual report of the Council was already in the hands of members. It was very full, and afforded a good idea of the work that had been done during the past twelve months. They would find in studying the report that as an Association they had unfortunately lost a few members by death. Further, they had lost a small number of ordinary members through resignation. In a way he was sorry to make such an announcement, because he never liked to see anyone resigning from the Association. Still, in some cases these resignations had been inevitable. Against these losses, they had to record on this occasion an increase in new members—ordinary and extraordinary—as well as associates. The financial side of the report he was glad to say was very satisfactory, and at the moment they had a good working balance. The money in hand, he thought, might possibly be utilized in improving the "Transactions," and in increasing the research fund.

Mr. A. SMITH (Glasgow) observed that the older members of the Association would unanimously endorse the action of the Council in putting Mr. David Terrace on to the roll of honorary members. As one who had served under Mr. Terrace for some time, he could testify to the work he did for the Association. Some 36 years ago, he received a mark of esteem from the members, in the form of an oil painting of himself. Then he felt sure that many of the older members would remember the practical interest Mr. Terrace took in the Murdoch Memorial Fund. They had in the Wallace Monument in Stirling a very fine bust of William Murdoch; while in the University of Glasgow, there was a gas-engine as a memorial to his name. It was well to keep in mind the fact that Mr. Terrace was largely instrumental in making arrangements for both these presentations.

The SECRETARY (Mr. David Fulton) intimated that the Council had agreed to admit the following three gentlemen to the membership of the Association: Messrs. Wm. Brown (Messrs. James & Wm. Brown, Ltd.); John Anderson (Messrs. Alder and Mackay, Edinburgh); and James Riddell (Manager of the Gas Coke Department of Messrs. J. & W. Brown, Ltd.).

No questions were asked bearing on the report of the Council; and it was unanimously agreed to.

Mr. JOHN M. SMITH then proceeded to deliver his

PRESIDENTIAL ADDRESS.

Gentlemen,—In taking the chair on this occasion, it is impossible for me to allow the opportunity to pass without thanking you for the high honour conferred upon me in electing me your President. I appreciate the honour more than I can adequately express. At the same time, I am conscious of my many shortcomings, and of my inability completely to discharge the many important duties which necessarily fall upon me. I shall, however, carry out those duties to the best of my ability, and feel sure that I can confidently rely upon your sympathy and co-operation. With your assistance I am sure that our autumn meeting will be no less successful than many previous brilliant gatherings.

TWO-STAGE CARBONIZATION.

Although it is customary in a presidential address to survey the whole position of the gas industry, and touch on the many problems that are continually before us, I hope that you will bear with me if I more or less restrict my remarks, and give you my experiences of the two-stage carbonization method of gas manufacture as practised here. During recent years many departures have been made from the old methods of carbonization in horizontal retorts, and we are continually being confronted with improved methods and improved plant. Complete gasification has a great fascination for the gas engineer; the expression itself seems to suggest the ideal—by husbanding and working to the highest degree of efficiency our great national asset, coal. While every gas engineer must welcome fresh information regarding improved methods and plant, the question of the relative costs of the various systems is very difficult to arrive at and at times misleading, and renders the selection of any particular system a very complex problem to decide. Local conditions must after all be a big factor in the gas engineer's ultimate decision. We are indebted to those large undertakings which do so much pioneer work by testing and bringing to a state of perfection the various methods of gas production; it is impossible for the majority of us with the limited facilities at our disposal to carry out this work, as often a considerable time has to elapse in working out existing plant. Under the latter conditions, it is incumbent upon us to endeavour to get the best work possible out of our existing plant with the minimum of alteration and expense until we are in a position to adopt any improved method.

Our carbonizing plant, as most of you are aware, consists of mechanically operated horizontal retorts, 20 ft. long and 22 in. by 16 in. in cross section. Each oven is heated by an internal producer on the discharge side; and there are ascension pipes on one side only, also the discharge side. Charging and discharging are done by electrical machines; one a Dempster-Toogood, and the other a Jenkins' D.B. projector. This plant, which was erected in 1907-08 and extended in 1910, is still full of life, and is doing excellent work. It was selected as eminently suited to the coals mined in the district, so that full advantage could be taken of local conditions. The principal coals used—mined at Bannockburn and Plean—are of a highly coking nature, and allow of a very heavy charge being employed in the retort; in fact, the retort is filled to within a few inches of the roof. The average weight of charge per retort is almost 8 cwt. This weight of charge can be easily dealt with by the machines, especially in discharging, as after carbonization it is caked into practically a solid mass, and requires only 6½ H.P. to start it in motion, 3½ H.P. being required thereafter. The ease with which the heavy charge is dealt with is also due to the adoption of silica segmental retorts. These can be built straight and true from end to end, and repairs and renewals carried out with the minimum of expense and trouble. The sections are of Stein's silica; and it has been found that the amount of saving by the adoption of this type of retort has been 33⅓ p.ct. per annum. Considerable improvement has been recently made in the composition of this material in respect of expansion and contraction. Previously straw rope was inserted in the vertical joints at the end of each segment to allow for the expansion, with the result that it took a day or so before the retort became gas-tight.

It is now found preferable to joint the segments in the ordinary way with silica clay, as the 1 p.ct. expansion which takes place squeezes out part of the jointing material while it is still in a green state; and, as there is no after or permanent expansion in use, this method ensures that the retort is absolutely gas-tight from the commencement.

There are critical temperatures, however, at which this material is more liable to spalt in heating and cooling; but if carefully treated in the early stage of initial heating, no trouble is experienced. As the bulk of this new silica is composed of cristobalite, the most sudden change in which takes place at temperatures between 198° and 274° C., very slow and gradual heating is to be desired at this early stage. It was considered that the most dangerous period in heating-up was when the retorts were showing a dull-red heat, whereas the really dangerous time is before the material gets red hot; there being very little danger of damage being done by fairly rapid heating after redness has

been obtained, dull redness requiring a temperature of somewhere about 700° C.

When segmental retorts were first used, the pier walls, &c., were constructed of ordinary fireclay bricks. This has been found to cause distortion of the retort, due to the different degree of expansion and contraction of the two classes of material. Now the settings are built entirely of silica material, which adds to the cost of construction; but increased life and better carbonization results more than compensate for the difference in initial cost.

Trouble was at first experienced in scurfing, by the workmen at times knocking out a whole section from the roof of the top row of retorts. This, however, has been overcome by a rearrangement of the pier walls in the setting. The first of our segmental silica retorts (installed five years ago) were repaired this year for the first time. Two new silica sections and new fireclay mouthpieces were required at the charging end; otherwise the retorts were in good condition. The straight coal gas produced from the local coals by the method of working described, is of very high quality, too high in fact for economical use by the consumer. An analysis of the coal sampled over an extended period shows:

	P.ct.
Moisture	1·8
Volatile matter	33·1
Fixed carbon	61·3
Ash	3·8
	100·0
B.Th.U. per lb.	14,296

The composition of the gas is:

	P.ct.
Carbon dioxide	1·0
Oxygen	0·2
Unsaturated hydrocarbons	3·0
Carbon monoxide	7·6
Hydrogen	45·5
Methane	35·4
Nitrogen	7·3
	100·0

In order to bring our carbonization methods more into line with modern practice, a blue water-gas plant was installed in 1920 by Messrs. Humphreys & Glasgow, Ltd. It was difficult indeed to fix on the type of plant which would be best suited to our requirements and conditions. To produce water gas from the local coals with their high coking qualities seemed to be out of the question, unless it was worked in two stages—that is, the coal first carbonized in our horizontal retorts, and the resulting coke used for the production of water gas. Complete gasification (as I said previously) sounds very attractive, and is even more attractive when it can be achieved in one operation; but bearing in mind that incandescent carbon is necessary for the decomposition of steam, and that before soft coking coal can become incandescent, it must be coked, it seemed to me that I must use coke for the manufacture of water gas, if I wished to take advantage of the splendid coals at our door, or endeavour completely to gasify the free burning coals from other districts in a different type of plant. The decision to be guided by the local conditions, I am certain, has been economically sound; and the improvement in working results obtained will give us ample opportunity to work out existing coal carbonizing plant much nearer to the end of its life of usefulness.

BLUE WATER GAS.

While most of you are thoroughly conversant with the manufacture of blue water gas from coke, I hope you will bear with me if I briefly describe the lay-out of our plant. The plant has a capacity of 400,000 c.ft. per day, and consists of a generator, scrubber, two De Laval steam turbines, exhauster, station meter, and relief holder.

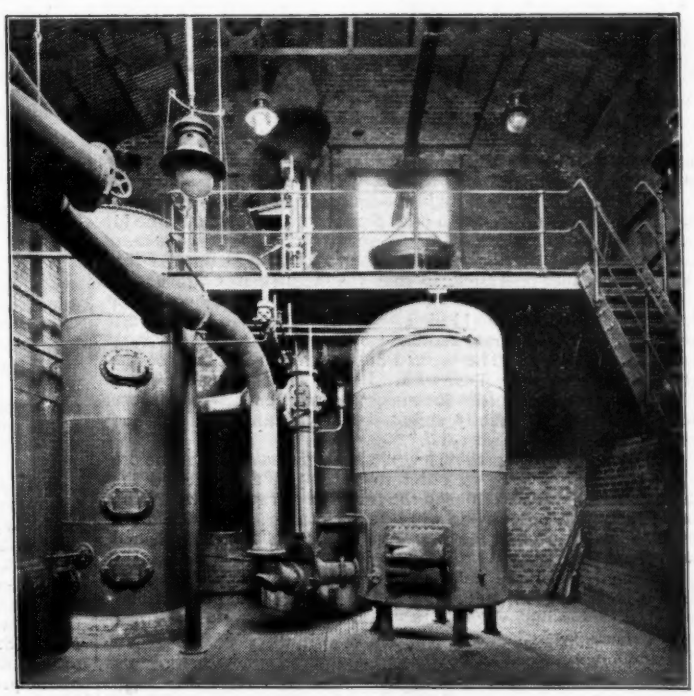
The generator is lined with a 3 in. coating of non-conducting material next to the outer shell, and firebrick blocks of various shapes and sizes, built in such a way that the ten rows of blocks immediately above the grate bars can be taken out and renewed without removing the support of the overhanging brickwork in the upper portion of the generator. These special blocks are placed in the hottest zone where the maximum wear and tear takes place, and were only replaced after 947 sixteen-hour days' working. The lower portion of the generator was at first gradually contracted towards the grate bars; but this was found to be unnecessary and to add difficulty in clinkering. The generator sides are now straight, except the overhanging brickwork at the top. The generator is charged by means of a skip which holds 4½ cwt. of coke. This skip is elevated and conveyed by an electric hoist travelling on an H beam directly above the charging door. The air supply is obtained from one of the turbine-driven fans, which provides a blast pressure of 20 in. The steam required for the generator, turbines, and exhauster is taken from the Babcock boilers, which supply the rest of the works, by a direct main pipe provided with a regulating valve, which gives a constant pressure of 80 lbs. at the plant.

The scrubber is divided into four compartments, each with a quantity of large clean coke; water being admitted at the top of the scrubber, where a suitable sprinkling device is fixed, allowing the water to be evenly distributed over the surface of the coke. The gas passing up through the scrubber is taken off at the top by a T-piece, one end of which goes to the meter and exhauster, the other to the relief holder, one 10-in. main serving as both inlet and outlet for the holder.

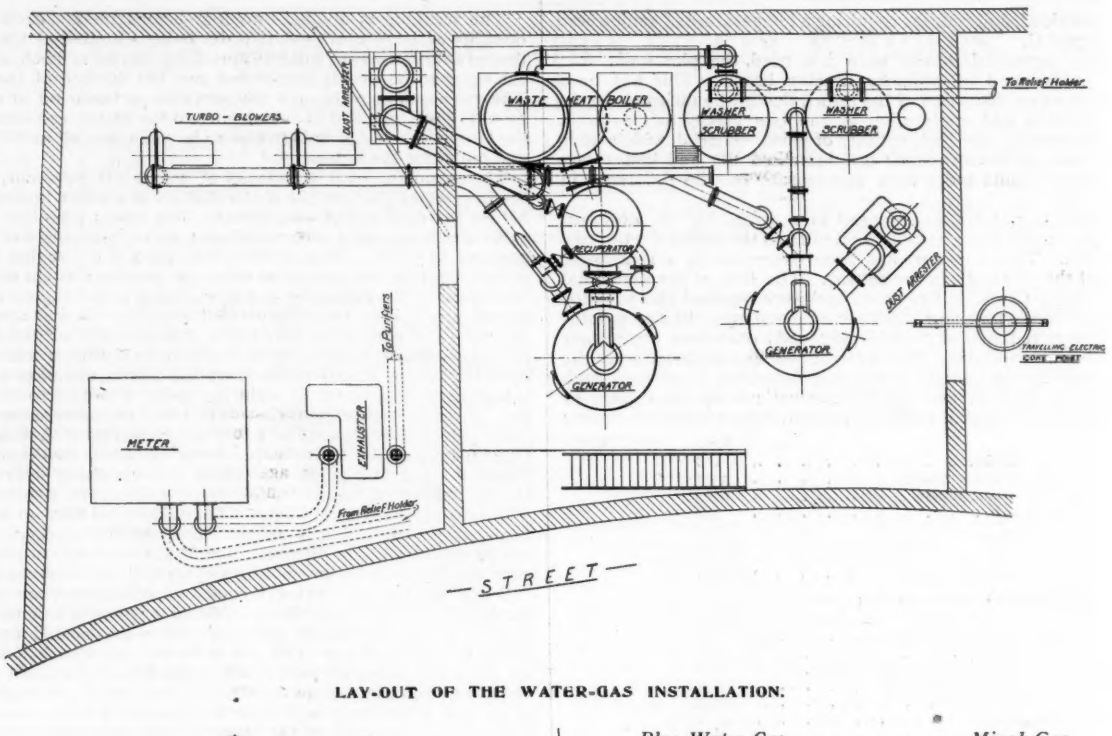
The exhauster, with a capacity of 30,000 c.ft. per hour, forces the blue water gas into the coal-gas main at a point immediately before the coal-gas washing plant. The steam pipe line to the exhauster is provided with a reducing valve, reducing the steam pressure to 30 lbs., which controls the speed of the engine, which, in turn, controls the amount of water gas passing into the coal gas. The speed of the exhauster can be varied at will, but once set will deliver any desired quantity without requiring further attention. All the water gas passes through a station meter of 30,000 c.ft. per hour capacity before it is mixed with the coal gas; and by the operator taking hourly readings of the meter, complete control is kept over the amount of water gas being admitted to the coal gas. A 10 in. main carries the gas from the scrubber outlet to the relief holder, the capacity of which is 170,000 c.ft. A holder of this capacity allows of the plant being worked in two eight-hour shifts, and provides ample storage for the remaining eight hours. It also allows of Sunday work being reduced to a minimum, with a resulting saving in wages. The gas also gets time to become thoroughly mixed, which means more uniform quality. Since the plant was brought into operation, 188,688,000 c.ft. of gas have been manufactured, representing 38·7 p.ct. of the total gas made.

When starting up, several cycles of operation were experimented with, and ultimately a cycle of one-and-a-half minutes' blow and four and-a-half minutes' run was decided upon as giving the best results. The run is broken up into half-minute up, three-and-a-half minutes down, and a final half-minute up, to sweep out the gases before opening the blast valve. The number of up and down runs was next experimented with in an endeavour to get as much of the clinker out of the generator without its adhering to the walls. Ultimately it was found unnecessary to change the rotation—that is to say, every run consists of one minute up and three-and-a-half minutes down—except when coking, then a plain up run of four-and-a-half minutes takes place after each skip of fuel, in order to bring the cool coke to a state of incandescence as quickly as possible. In this way very little clinker adheres to the generator walls, and clinkering troubles are practically nil. Once a week is found sufficiently often to empty the generator; and two workmen can clear all the clinker from the walls with a scurfing bar in about an hour. I believe clinkering difficulties are peculiar to plants using coke from Scotch coals, and are much aggravated where coke of different natures is used. We are singularly fortunate in having a suitable coke of practically a uniform quality throughout the year.

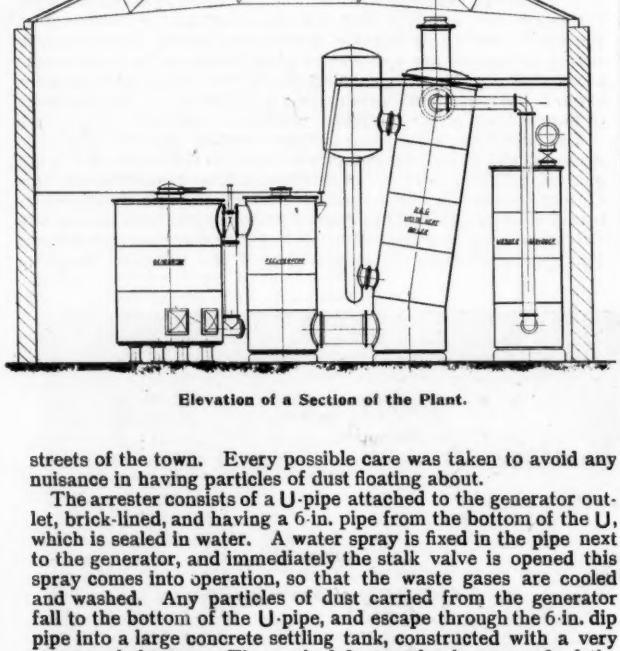
The operating of the plant is done from an elevated platform, where all valves are conveniently situated to the operator's hand and interlocking, so that it is hardly possible to make a mistake. During the blow period, a dust arrester comes into operation, as it was thought advisable to employ some method whereby the fine dust usually emitted from the stalk could be dealt with; the works being situated within short distance of the principal shopping



VIEW OF "H. & G." WATER-GAS PLANT AT STIRLING.



LAY-OUT OF THE WATER-GAS INSTALLATION.



Elevation of a Section of the Plant.

streets of the town. Every possible care was taken to avoid any nuisance in having particles of dust floating about.

The arrester consists of a U-pipe attached to the generator outlet, brick-lined, and having a 6-in. pipe from the bottom of the U, which is sealed in water. A water spray is fixed in the pipe next to the generator, and immediately the stalk valve is opened this spray comes into operation, so that the waste gases are cooled and washed. Any particles of dust carried from the generator fall to the bottom of the U-pipe, and escape through the 6-in. dip pipe into a large concrete settling tank, constructed with a very steep angle bottom. The washed dust settles in one end of the tank, where it is easily dealt with. In fact this is the bye-product from the plant, and is sold for making cement blocks—a purpose for which it is eminently suited, being beautifully clean and granular like fine washed sand.

When commencing the run, a slight pause is made before closing the stalk valve, in order to sweep out the gases in the dust arrester, and also to keep the inerts in the gas down to the lowest possible content. It will be seen from the analysis of both the blue water gas and the mixed gas that this is accomplished with some success.

The analysis of the coke shows that the high percentage of fixed carbon makes it suitable for efficient water gas production.

	P.Ct.
Volatile matter	2·5
Fixed carbon	85·2
Ash	12·3
	100·0

Blue Water Gas	P.Ct.	*Mixed Gas.*	P.Ct
CO_2	3·4	CO_2	2·3
O_2	0·2	O_2	0·2
CO	42·2	C_mH_n	2·3
H_2	49·4	H_2	52·7
CH_4	1·2	CO	19·2
N	3·6	CH_4	19·2
		N	4·1
	100·0		100·0
Total inerts, 7·2 p.ct.		Total inerts, 6·5 p.ct.	

With the water-gas plant fitted up as an entirely independent unit and all the gas being metered, a complete daily record is obtained of the working. By scrutinizing the daily figures, any change that is taking place in the efficient operating of the plant is seen at a glance, and the trouble can be dealt with at once. Taking the figures over an extended period (twelve months), these records show that the results obtained are quite as satisfactory as short tests which are taken periodically (usually a week's duration under favourable conditions; the results being worked out to normal temperature and pressure.

The thermal efficiency of the plant for the year ended May 15, 1923, shows 58·7 p.ct. This is excluding steam used by turbines.

When the plant was erected, provision was left with the intention of laying down a duplicate set; and as you will see from the prints, this set will be provided with a waste-heat boiler, which I am expecting will raise the efficiency by something like 20 p.ct.

From the year's working of the two-stage system, the following results have been compiled.

Total gas made	910,563·7 therms
Coal used	11,396·6 tons
Coal gas made	701,739·8 therms
Coke used for manufacture of water gas	1003 tons
Amount of water gas made	208,790·0 therms
Calorific value of mixed gas	484 B.Th.U.
Make per ton of mixed gas	79·86 therms
Make per ton of straight coal gas	61·57 therms
Make per ton of water gas	208·12 therms
Percentage of water gas in mixed gas	35·8
Calorific value of water gas	310 B.Th.U.
Calorific value of straight coal gas	581 B.Th.U.
Coke sold per ton of coal	8½ cwt.

With these particulars before you, some conclusion can be arrived at as to the advisability or otherwise of adopting this method of carbonization, taking into consideration all the circumstances of the case.

GAS REGULATION ACT, 1920.

With the introduction of the Gas Regulation Act, 1920, this Company, along with the Coatbridge Gas Company, immediately made application under section 1 of the Act for permission to sell gas by the therm; and we have been working under the Act for over two years. Difficulties were naturally experienced during the period of transition, chiefly owing to the fact that the financial position of the whole gas industry required revision at this time. Costs had increased to such an extent that sliding-scale arrangements (fixed in our case in 1898) as to price of gas and dividends of statutory gas companies had become obsolete. Consumers not acquainted with these facts were naturally unable to account for the slight increases in their gas bills; putting the onus for this on the adoption of the therm method of charging. The application of this Company to the Board of Trade under the Act

was an unopposed one, the Local Authorities being satisfied as to the reasonableness of the Company's application. There can be no doubt whatever that with the general adoption of this Act gas consumers' interests are absolutely safeguarded, as they are only being asked to pay for quality received. In the past, under the old lighting standards, accuracy could only be problematical; but under the new Act, hard and fast rules are laid down which must not be departed from. All testing apparatus in use must be passed by the Gas Referees and be of proved accuracy, and a definite number of tests periodically made by a gas examiner appointed by the local authority.

While it is open to gas authorities to declare any quality of gas (within limits), the Gas Referees protect the consumer by prescribing certain minimum pressures in mains over a certain size; while the onus is put on the gas undertaking to maintain all gas-consuming apparatus, so that the quality declared can be consumed with economy and efficiency. It will be seen that under these conditions the consumer cannot be placed at any disadvantage.

The adoption of this Act, however, entails closer attention to the gas manufacturing process by the engineer, in an endeavour to maintain constant quality, and also freedom from inerts with their accompanying disadvantages.

Generally speaking, I am of opinion that if the gas industry of this country is to maintain its position as a scientific and efficient organization, the whole-hearted adoption of the Gas Regulation Act can no longer be delayed.

INSTITUTION EDUCATION SCHEME.

As will be seen from your Council's report, close co-operation is being maintained between our Association and the Institution of Gas Engineers in connection with this matter. The interests of this Association could not be better served than by Dr. Gray of the Royal Technical College, Glasgow, whose experience in connection with Scottish Educational matters is quite unexcelled. This scheme will without doubt have the effect of raising the status of the coming gas engineer, and will reduce to a minimum the risk of rule-of-thumb methods being adopted in the management of gas undertakings.

As already stated, in setting out to write this address, it was not my intention to give a general résumé of the position of the gas industry, but to restrict myself to matters chiefly concerning my own undertaking, which I hope will prove of some slight interest to my brother managers.

Mr. J. W. CAMPBELL (Dunfermline) said that as Mr. M'Lusky had just been called away from the meeting, it fell to him to propose a vote of thanks to Mr. Smith for his interesting and practical address. It was a pity that the unwritten law was still in operation, to the effect that the address of a President might not be discussed; otherwise Mr. Smith would have been rewarded with a brisk discussion on many of the points he had touched upon in his comprehensive review.

Mr. JOHN WILSON (Motherwell) remarked that in listening to the President's address one got the feeling that the old firm—horizontal retorts—was not quite dead. Mr. Smith had shown most effectively that with the scientific use of water gas he could give vertical retorts a very good run for their money. At the same time, the President had shown that it was only by careful management and recording of data that good results could be attained. He thought their President was to be complimented not only on his paper, but on his results.

The PRESIDENT, in acknowledging the vote of thanks, said that the preparation of the address had largely been a labour of love, because the results were just at his door, and he had experienced no difficulty in collating them.

THE LIGHTING LOAD.

At this stage the meeting was thrown open for a discussion on "Our Lighting Load"—the subject of a paper* read by Mr. Edison Stones at the Spring meeting in Edinburgh. To stimulate discussion on newer aspects of the question, papers on the subject were submitted as follows.

THE CONSERVATION OF THE LIGHTING LOAD.

By JAMES BELL, of Dumbarton.

While the choice of subject is not exactly my own, I appreciate the fact that it is one which, in these competitive times, merits fuller consideration. The need for assertiveness in conserving the lighting load was fully emphasized by several members at the Edinburgh meeting, and has been reiterated in leading articles in the Technical Press since that date. In continuing the subject, I find it necessary to retread to some extent lines of argument which are not altogether unfamiliar; but I willingly do so, in the hope that you will avail yourselves of the opportunity for frank discussion, with a view to arriving at a definite policy which will establish to its fulness the competence of gas as a lighting agent.

I have no doubt our industry would, if called upon, be unanimous in passing a resolution expressing its implicit faith in gas as an illuminant; but passing resolutions will profit us nothing. Profession of faithful allegiance to the lighting agency of gas is only serviceable in so far as its conviction enables us to establish a practical creed. We must have faith in gas, and, more important still, we must work for gas. We cannot shut our eyes to the fact that we have, to some extent, lost ground with our lighting load, and will certainly continue to lose ground unless we enter into the real spirit of competition with electricity. If we continue indefinitely in our rôle of passive resistance to the encroachments of our competitors, it is not too pessimistic to prophesy that in certain departments of lighting gas will be ultimately superseded. Our calm exordium has perhaps no counterpart in the whole history of competitive effort.

Some are inclined to seek consolation in the fact that our product has a large and expansive field of activity, irrespective of the lighting load. They regard the consumption of gas for illumination purposes as a smaller quantity in comparison with the consumption for heating and power. To such as may be disposed to sacrifice passively—although reluctantly—a portion of the lighting load on the grounds of its relatively small output compared with cooking, heating, &c., I would reply that the loss is in effect much greater than superficially appears. It is not simply by arithmetical calculation that the effect of a decreased output for lighting is to be estimated. The deduction in revenue directly due to a reduced lighting load will certainly be appreciable in itself; but it is the magnitude of the indirect loss we have to fear most. In failure to retain fully the output for illumination, one can espy the looming shadow of a more general catastrophe. Even a feather suffices to show how the wind is blowing. Once electricity is installed for one purpose, where is our protection from its further aggressions? Our competitors can the more easily effect other conquests, once they are established.

The electrician, when he finds a convert to his system of lighting, is not slow in pushing his custom. He knows electricity attracts because of its novelty. He trades on the temporary fascination of his customer, and is ever ready to seize the opportunity of installing an iron, a sweeper, and all things electric. The same electrical mains and services can be laid, without appreciable additional cost, for more than lighting; and it is only natural to expect the consumer to give his new adoption a fair chance all round. This is the besetting danger to the gas engineer who views with equanimity the loss of a few lighting consumers. Our industry must concede nothing at all. If it does not fight electricity on the issue of lighting, it will find the next encounter joined on a greater issue, and against a more confident foe.

The competition with electric light must be regarded seriously, as our lighting load has already yielded somewhat to the attacks of the adversary. The policy, or rather absence of policy, of the past must therefore be abandoned, and with this abandonment we come to the most important part of our business concerning the lighting load—viz., the definition of our attitude in the future. It is in the framing of a policy, whereby we shall retain, recover, and develop this outlet, that discussion will be most helpful, and in which I would anticipate most diversity of opinion. The attitude we adopt will largely identify itself with the establishment of some form of maintenance staff. Efficiency is our greatest strength, our best advertisement. Lighting is the department in which the greatest inefficiency has prevailed, and, consequently, the line in which we have conceded most to outside competition. Hitherto we have relied on the services of private traders, and an intelligent use in the household, to secure for gas-appliances their best results; but we can no longer afford to leave maintenance to such haphazard attention. It is in our own interest, as well as in the interest of the gas consumers, to eliminate inefficient, badly-designed, "cheap" burners. We are competing with appliances which need comparatively little regulation or adjustment. It is only in this respect that electricity is more favourably placed; and, if we are to compete on an equal footing, the onus of ensuring the best results from our commodity rests with ourselves.

Away with that complacent attitude of entirely relegating this vital work to private traders, plumbers, self-styled gasfitters! This folly has been tried long enough, and gives no satisfaction to the community, the disappointed tradesman, or ourselves. It is a clumsy method of robbing all to enrich none. The supervision and maintenance of gas burners and fittings is essentially our work. Let us do it, or at any rate let us share in it with the outside traders, involving as it must the appointment of a maintenance staff. To meet the cost of such additional staff, I have heard the suggestion that a nominal fee be chargeable for attention to, and maintenance of, a consumer's fittings; but I would anticipate that the percentage of consumers likely to take advantage of such a scheme would be negligible. This, I believe, has been the experience in towns where the proposal has been given a trial; so that any maintenance scheme, to become entirely successful, must be voluntary. The cost can be argued as a perfectly legitimate charge to be included in the gas rates. In Glasgow, I believe such an efficiency assessment has been estimated at approximately 1½d. per 1000 c.ft. increase on the gas rates. If we accept this figure, then we must agree that the charge for maintenance is a sound investment.

Apart from the question of cost, the policy of voluntary maintenance will involve, in some cases, an understanding and arrangement with the plumbers and private traders. The plumber has come to regard the sale and fitting of certain gas-appliances as his inalienable right, and it would seem more politic to co-operate with him than to exclude him. He is naturally jealous of any encroachments upon what he considers his stock-in-trade. We must therefore endeavour to show him that by transferring the maintenance and control of fittings into our hands we are not usurping his sales. By joining with us, his trade will not diminish, but greater satisfaction to the public will accrue from his services. In the past, gasfitting has only been a side line to the plumber.

* See "JOURNAL," Vol. CLXII., p. 95.

It is a job he tackles without knowledge or understanding. He experiments; he is the victim of circumstances, blindly exploring without rudder or compass. He has never made it his business, for instance, to discriminate between the efficiencies of burners. His primary aim is simply profit. If after selling and fitting a gas-appliance a reasonably good light is obtained, he is satisfied. Whether an equally good light is obtainable from another burner, less extravagant in its gas consumption, is not his concern. On the other hand, should a poor illumination follow from his ill-conditioned appliance, he really believes it is due to the inferior quality of the gas. Gasfitting is a job for which he has had no special training; and it is in giving kindly advice that we can help the outside trader and, ultimately, ourselves. We can only ensure efficient service to the community by obtaining supreme control over the issue of all appliances and fittings. This is the only way of eliminating cheap, shoddy rubbish.

As a means of placing this control in our own hands, the establishment of a wholesale house or showroom has most to commend it. Retail plumbers can visit it, and purchase approved goods at wholesale prices. The advising and encouraging of the outside trader will contribute a great deal towards better service to the gas-consuming public and to the industry's retention of the lighting load. The showroom is not intended solely as a store-house for the guidance of private enterprise, but as a public educational centre in the uses of gas. Modernized and properly equipped, the showroom is potentially our industry's greatest advertisement. We must demonstrate what gas can really do. Our task primarily is to enlighten the people, secondly, to give them light; the second will follow from the first. A display of appliances in good condition and in suitable surroundings, giving the best results, is bound to carry conviction. Attract our customers; let them see that gas is no second-rate commodity; demonstrate its ornamental adaptability to any circumstances and surroundings. When you accomplish this, you have captured your opponent's best card. Remember, he is counting on taking a trick from the fascinated and the unwary; but when enlightened, these people will recognize the absence of more solid acquirements among the superficial and dazzling electrical appliances. It only requires assiduous advertising effort to administer to electricity its quietus, even in the field of lighting. As far as public lighting is concerned such a blow has already been dealt in the City of Westminster, and in several of our own towns, the streets and public thoroughfares of which were formerly lighted by electricity. The retention of the lighting load is well within our grasp; its price is perpetual vigilance and public demonstration.

The well-appointed showroom is really an indispensable adjunct to any progressive undertaking. Our competitors—in fact, all commercial manufacturers—place their goods in the window; so must we. I am a firm believer in the showroom, and should probably account for the absence of one in Dumbarton. The omission is not due to any lack of confidence in its success as a paying proposition, but to the fact that we have just emerged from a period in which we have encountered the greatest difficulty in maintaining a sufficient supply of gas to meet existing demands. Being now more favourably placed, however, as regards new plant and increased storage, the long-felt need for exhibition and educational premises will be attended to in the immediate future.

In conclusion, I may say that in formulating and suggesting to you means by which our industry may conserve the lighting load, I have been influenced by the conditions that have obtained in the several towns in which I have served. I am well aware that different circumstances obtain in different places, where the menace of electrical competition is not equally imminent. Modifications in the principles which I have ventured to propose will readily suggest themselves to meet particular needs. For instance, in your relationship with the plumber and private trader, you may feel disposed to adopt an alternative policy. The ideal for us would be the acquisition of full and absolute control of gas from the retort to the lighting of the domestic burner, thus making our undertaking self-sufficient and independent of external agency. This ideal, however, does not appear practicable at present; and it is on this account that I have proposed compromise or conciliatory adjustment. Finally, I would earnestly invite your respective views on this vitally important question—the retention of the lighting load. If it is worth retaining, it is worth fighting for. You have heard the prediction that electricity is the light of the future. Let us challenge and disappoint the prophecies.

OUR LIGHTING LOAD.

By JOHN WILSON, of Motherwell and Wishaw.

Continuing the discussion on the paper "Our Lighting Load," which Mr. Stones presented in the spring, I shall endeavour to bring into focus what are, in my opinion, the outstanding points to be considered for the retention of gas lighting.

PUBLIC AND DOMESTIC LIGHTING.

Our lighting load may be divided broadly into two classes—namely, public and domestic. Conditions in the two branches are widely different. Public lighting has never been allowed to wander far away from the controlling hand of the gas engineer; and this probably accounts for the outlook in this branch being much more optimistic than in the other. For street lighting, provided that proper attention is given it, gas is highly satisfactory; and if a special display is required, high-pressure gas lamps have yet to be beaten, for they easily outshine those of rival illuminants. With fair treatment from the lighting authorities, the retention of this load should cause us few misgivings. One has but to observe the lighting in the streets of London, Belfast, and Paris, to be impressed with the superiority of gas lighting.

The conditions in domestic lighting are less encouraging. For the past few years electricity has been steadily strengthening its position. The trend of public opinion has undoubtedly been to favour electricity for dwelling-house illumination. This, moreover, is not without reason. We must not be blind to the fact that the average standard of lighting is higher in electrically-equipped houses than in those lighted by gas. Why should this be? I attribute it to two reasons. First, gas managers have ever been too lackadaisical in dealing with this vexed question; they have always been prone to sit and leave this important duty to jobbing plumbers. Secondly—and this is practically a result of the first—faults have arisen in the application of gas to lighting, and have remained uncorrected by us for lack of proper organization. I need hardly remind you of the troubles in domestic lighting we so frequently meet with from shoddy and inferior fittings, from choking with dirt and dust, from lack of adjustment, from deposits and corrosion in pipes, from faulty and distorted connections, to say nothing of the mains and services that have become too small for their work. These faults have gradually brought discredit on gas as a lighting agent. Should not our first effort be, therefore, to eliminate these faults? How can this be done?

MAINTENANCE.

Mr. Stones has supplied the answer in one word, Maintenance. The field of the gas engineer's work used to be considered as limited to gas manufacture. This point of view is obsolete. His real duty is clearly manufacture and application. What we need is a staff of men to inspect consumers' fittings, making certain that everything is in good order and working satisfactorily, and, incidentally, keeping our customers pleased with the service. For, after all, this is, I think, the main consideration, and is really of more importance than cost. It is well to remember that "A satisfied customer is our best advertisement." Mr. Bell has pointed out how this matter could be worked; and I think the method he suggests would be most satisfactory in conjunction with a showroom. We are faced with a problem in the opposition of independent plumbers—more particularly the case with a corporation undertaking. But by giving them preferential rates in buying fittings, and by getting them to collaborate with us, we might soon find that they were our friends, and not our enemies. The cost of such a scheme has already been given as 1½d. per 1000 c.ft. This is very small when we consider the advantages gained by the consumer. The flat rate of charging commends itself more to me than does the alternative of charging each consumer separately for service. The importance of maintenance cannot be too strongly emphasized. It is one of the keynotes of our future progress. But more is required than this to make our position secure. We are by no means out of the wood. Our rival, electricity, has yet a great advantage over us in the matter of convenience.

CONVENIENCE.

The public are prepared to pay for convenience. They resent the worry of cleaning gas-fittings and tinkering about with adjustments; that is why we should give them maintenance. They will not strike matches if they can achieve the same end by pressing a button. Electricity has made great strides in the past, chiefly due to one reason—simplicity of operation. We certainly have switches, but they have never passed the makeshift stage. They are expensive to instal, and "finicky" to handle; they never met with what could be termed universal adoption. When we can control all our lights from a neat little switch, conveniently placed, when we can give equal convenience, then we shall have a chance of winning the field. Here is our chief weakness; and this offers considerable scope for the inventive faculty of the manufacturers of gas-appliances. Then again, consider the simplicity of electric fittings; one socket taking all sizes of lamp. As to the dimensions of mantles and nozzles, they are legion. There are, in the main, three sizes, universal, medium, and bijou; but the exact size of the nozzle and mantle depends on the manufacturer's own particular preference. Such a multiplicity of fittings only leads to confusion. The retailer of mantles cannot be expected to stock so many different sizes. The gas department can easily do so under the maintenance scheme.

Gas as an illuminant has many advantages. The light from an incandescent burner is more penetrating than ordinary electric light and very much more sympathetic to the eye. It is by no means behind in cleanliness; ceilings do not blacken even after five years, though we should, in the interests of hygiene, have them done several times in that period.

The general warming effect from incandescent gas lighting in a room is a very much more valuable asset than is generally appreciated, a point which I have had frequently illustrated, more particularly in connection with new houses. Furthermore, the cost is strongly in our favour.

ELECTRICITY THE FASHION.

The poorer-class house is one in which I do not think we are so liable to lose the lighting. Connections must be laid for gas for heating and cooking; and probably the expected return would not

warrant the electricity department's laying new cables for lighting only. In such dwellings there is frequently only one living room, so that the question of switching the light on and off is not of such pressing importance. I have often noticed that in small houses people do not seem to consider it a trouble to keep their globes and burners clean. The position in better-class houses is different. Electric light has now become the fashion. New buildings are nearly all installed with electric light, the older ones are having the gas system scrapped. To our shame, be it said, we sat still while we were being made out of date. To give an instance of how firmly rooted this impression has become, I may mention a housing scheme of 1000 houses which has recently come under my notice. It was pointed out to the authority that, as the gas department were already laying mains for cooking and washing purposes, it would be a gross waste of money to instal electricity for lighting only, for gas could successfully do what was required. The cost of electrical installation, including mains, would be about £30 per house, or £30,000 in all. In spite of this, gas received no consideration; their minds having been made up. Public opinion maintains that a desirable residence should be electrically lighted. We are in a fair measure responsible for this *impasse*. One of our hardest tasks will be to remove this mistaken idea from the public mind.

ADVERTISEMENT.

Gas for lighting has not been sufficiently boosted or canvassed in former times. Electricity, on the other hand, has been scrupulously pushed by the electricity department on the one side, and the private wirer, with his door-to-door badgerings, on the other. We must use to the full our opportunity of advertising through the medium of our fitters and survey collectors. Our showrooms (it is imperative that we have them) should display only the very latest in lighting equipment—not even last year's, but the newest and best fittings available. Our offices should be a revelation in gas lighting, in order to compel the attention of our consumers and others by the possibilities of such brilliance. Too often the public simply have not known what we could give them, or what was obtainable. We must advertise, demonstrate, and show that "we have the goods." We must give satisfaction. When we have done this, the fashion will probably change. We must learn the secret of publicity. When people realize what can be done with gas for lighting, then, and only then, will it regain its popularity.

WORKMANSHIP.

Further, we must instil into our workmen the spirit of enthusiasm and responsibility for the success of gas lighting. Only last month I was shown a split ¾-in. socket cut out from a pipeline, the bore being almost filled up with jointing material; and this on a new building, on which no reasonable expense had been spared. It is idle for us to preach or practise maintenance when we have such criminally careless workmen engaged on installations. There is not the slightest doubt that the success of even the best of schemes depends to a large measure on the skilful execution of their duties by those actually carrying out the work.

The Gas Regulation Act ensures that our quality and pressure will be even more regular than in the past. We can therefore look upon constant quality and pressure as a fact instead of a slogan. Given this, our heritage of gas lighting will not be squandered if we consistently keep before us the following four points:

1. Consideration for the public requirements.
2. A higher standard of workmanship.
3. The necessity for simplicity of operation—our need of a switch.
4. Most important and vital of all—maintenance.

The PRESIDENT said the feeling of members was that the discussion at the Spring meeting on the subject of the lighting load was altogether too short. Indeed, those who were present at the Edinburgh meeting would recall that the discussion was at a very lively stage when train time came along and many members had to leave. With the introduction of fresh controversial matter supplied in the papers from Messrs. Bell and Wilson, he was sure they would have a brisk discussion.

Discussion.

Mr. JAMES RICHMOND (Penicuik) had to confess to a feeling of disappointment with the two papers read, in that they actually coincided and agreed with the contribution supplied by Mr. Stones. He anticipated that either Mr. Bell or Mr. Wilson would have had something quite different to say from Mr. Stones; but in general their papers were absolutely in agreement. The question of maintenance was nothing new; and to his mind the matter was one that devolved on cost. Both Messrs. Wilson and Bell, as well as Mr. Stones in his paper at the Spring meeting, agreed that the cost should fall on the gas rate. He supposed there would be nothing particularly objectionable in the idea, provided everyone was agreeable. Nowadays nothing was free. Even education was not free, because after all the cost had to be borne in one way or another. Speaking for himself, he would be very much surprised if the business men and traders of Glasgow, who represented a large section of the community, and whose gas consumption ran into millions of cubic feet every quarter, would be content to pay this additional charge of 1½d. per 1000 c.ft. when it became known that in so doing they were pandering solely to a few paltry consumers in tenements. It was a matter of their own outlook after all. So far as he personally was concerned, he was a believer in making everyone pay for his or her own service. He had occasion in a works under his charge for many years to carry out a system of maintenance. There it was a general system of maintenance which applied all round. The principle followed was that of maintaining all mantles, burners, and fittings for an overhead rate of 2s. per annum. It was a case in which everyone paid for the cost of his own individual service. The system was one which gave no trouble to the large manufacturers—the big consumers of gas—or to the gas undertaking. The Glasgow scheme of maintenance, however, might be objected to by the large consumers, who would feel that they were being asked to shoulder in an unfair way the burden of the small users of gas.

The PRESIDENT said that in his opinion both gentlemen who had contributed papers to the meeting that day might have touched more on one aspect of the question—the idea of providing something to maintain. Both authors had said a great deal about the maintenance of burners; but until they got a proper supply in the houses, there was not much good in maintaining it. Mr. Wilson had made a reference to service-pipes; personally he felt this was where they ought to start. Until they got control of the service-pipe from main to meter, there would always be difficulty. In a number of gas undertakings he knew of, the piping belonged only to them from the main to the line of building; whereas the piping from the line of building to the meter usually belonged to the proprietors of the houses. In many old buildings, and in fact in recently-erected houses, service-pipes were being asked to carry a load for which they were altogether inadequate. Gas fires, cookers, circulators, and washing boilers were later installed, with the result that the lighting deteriorated. Especially was this the case when some of the aforementioned appliances were in use during the lighting period. The introduction of a new service-pipe into some of these houses was a difficult problem, and involved, as a rule, a considerable expense. Who was going to bear this expense? He was afraid it would have to be the concern of the gas undertakings. It would be recalled that the Gas Regulation Act in the early stages provided that service-pipes were to be increased sufficiently to carry practically the quantity of gas required, or made suitable for the quality of gas declared. That provision was eventually deleted from the official Act, and nothing was said about increasing the size of service-pipes. To his way of thinking, service-pipes, and even the internal fittings of a house, were of as much importance as the gas-fittings themselves. During the war period and since, the property market had been in a state of upheaval; and at the present time they found many people who were the owners of the houses they occupied. In Stirling experience had gone to show that this class of proprietor could be easily approached, and additional service piping, or piping of an increased size, introduced. Usually a little arrangement could be entered into for spreading the cost between the gas undertaking and the proprietors concerned. It was true that in some cases the gas undertaking in Stirling had to pay the whole cost. The main difficulty, however, arose in cases where tenants occupied houses that were factored by other people. Many of these factors, largely owing to the present state of the property market, would do absolutely nothing. They had a gas supply at present, and that was the beginning and the end of the story so far as they were concerned. It did seem to him that the gas industry would be placed in a much more advantageous position as regards the lighting load if they had some power to instal in private ground and in private houses service-piping of increased dimensions. At present they could not compel proprietors to put in larger service-piping for any of their tenants; and he (the President) was afraid they would require to get power of that kind if it was their intention to get the supply of gas maintained. In a number of cases throughout the town of Stirling, recording pressure gauges had been introduced. He had made a chart showing the different conditions in the houses in the course of twenty-four hours; and he had been surprised at the marked differences in pressure that occurred. At certain times they would get a pressure which was practically the same as that maintained at the gas-works, but at other times it would drop down to anything from 10 to 12-10ths. There was no question of this—that there was a difficulty in maintaining burners at all times so that they would give an efficient light. He noted Mr. Wilson pointed out that adjustments must not be continual. He agreed with this view. Then a reference to the blackening of ceilings was made by Mr. Wilson. There was a feeling among many people that the blackening of ceilings was due to gas; but on this point he would like to insist—that most of the blackening was caused by the dust of a room impinging on the ceiling. Of course, he agreed that the ventilation system of any apartment was improved by the use of gas; but there was no doubt whatever that dust in a room impinged on the ceiling and blackened it. They would all agree that they would be courting trouble if they told a housewife that her ceiling was being blackened because of the presence of dust in the room. It was a fact, nevertheless, and one which could be demonstrated.

Mr. GEORGE D. KEILLOR (Greenock) remarked that the papers which had been read might perhaps be described as a little platitudinous. The authors, instead of telling the managers what they wanted done, or what they wanted the members of the Association to do, would have done better to give something in the nature of a lead themselves. They might have been a little more aggressive. There were some people who took the view that it was not worth while to bother about the lighting load. He did not agree with that opinion at all. In point of actual fact, he wondered how many members present knew what the lighting load was. Could any of them say, for instance, what proportion it was of the total load? In Greenock he had kept for a long time a note of the load—say, from six in the morning till six in the evening. This could be regarded as the day load. The record between six o'clock in the evening and six o'clock in the morning could be looked upon as the night load. It would, he felt, surprise them to find that in Greenock in midsummer the lighting load was round about 40 p.ct. of the total load. In winter time the proportion of the day load was rather different of course. As a matter of curiosity more than anything else, he had taken out the figures from month to month. Something had been said by the President about service-pipes; and on this point he should like to remark that the main service-pipe particularly should be maintained by either the Corporation gas department or the gas company. Gas departments and companies were standing in their own light if they did not maintain the service-pipes. It was clearly the duty of the gas undertaking to see that the service-pipe was maintained in good condition.

He felt that for far too long they had been in the habit of supplying gas that was altogether too rich. One further point with regard to maintenance was this—that he was afraid the inspectors would have to use up a little more shoeleather in their examination of meters. What business firm in Great Britain or anywhere else could hope to do business with customers upon whom they only called once in five months, as their inspectors did in the summer time? Personally he felt the time was coming when they would have to follow foreign practice, and make provision for reading meters every month, and arrange for collecting accounts at the same time. It was surely a good argument to say that if they were expected to pay their accounts every month, then they ought to make their collection on the same basis. He understood that in Canada the meters were inspected every month, and the collection was also made then. These inspectors were skilled men who systematically went round a district. They might not all be doing maintenance work—some indeed were not; but the important thing to be remembered was that they were in constant touch with customers. If they heard that any particular customer contemplated an installation of electric light, then they were able to report the circumstances to headquarters, and steps were taken there to prevent, if possible, the loss of a customer. At the Spring meeting it would be recalled that he (Mr. Keillor) said something about the system of maintenance which was in operation in Greenock. As he explained, it was a very simple arrangement, which cost but little. In view of the percentage he had stated of the lighting load in Greenock even in summer—40 p.ct.—he did not think they would be at all justified in leaving it to the electrical engineer.

Mr. DAVID VASS (Perth) was disposed to agree with the preceding speaker—that the contributors of the various papers on the lighting load might have been a little more fertile in the way of suggestions as to the line of action to be followed. One line of action that might be pursued with advantage was to instal governors in every house free of charge. Householders appeared to regard the necessary work of adjusting fittings as a bit of a nuisance; and the governor would, to some extent, get over that grievance. As an illustration of what he meant, he might explain that not long ago friends of his were visiting his house. These were people who had discarded gas, and had introduced the electric light as their illuminant. They were much impressed with the illumination they saw in his home establishment, and frankly remarked that if they had had gas like his, then they would never have discarded it. He (Mr. Vass) pointed out that their illumination could have been the same, if they had given attention—as he had to do—to certain necessary adjustments of burners. There was no question of this, that the average householder did not want to be troubled with adjustments, and as a general rule he had not the knack of doing it. The installation in every house of a governor capable of doing automatically certain required adjustments, would unquestionably prove advantageous. Mr. Richmond, of Penicuik, had volunteered the statement that large consumers would be disposed to kick against the proposed additional cost of maintenance. Personally he felt that was a matter which could easily be got over. In the city of Perth all large consumers were allowed a discount, and that discount was a fairly liberal one. As a matter of fact, the discount could be adjusted in such a way that the large consumer had not to bear the same proportion of cost as the small consumer. In Perth the discounts to very large customers varied from 30 to 40 p.ct. below ordinary rates. Surely a concession of this nature would cover the additional cost of 1d. or 1½d. per 1000 c.ft. for maintenance. In Perth they laid down service-pipes free up to the line of the public street. They were particular to have pipes of sufficient strength and dimensions for all future requirements. This was rather a strong feature in their policy. Indeed at the present moment he found himself in conflict with the Public Health Department because he had laid down what they considered to be too large a service-pipe for some new houses being erected in the city. The contention of the Public Health Department was that pipes could have been obtained very much cheaper if they had been supplied by outside contractors. Then in Perth there had been trouble a few years back owing to complaints regarding insufficient supply. Not long ago he placed a report before his Committee, and suggested that street by street in a certain area should be taken where there was a villa class of population. He had mapped out that particular area as one where there might be a renewal and enlargement of services. The work done had involved the Gas Corporation in an outlay of something like 2d. per 1000 c.ft. for a few years, but they were now getting complete satisfaction in that district. In one or two instances the proprietors were not inclined to allow the Gas Department to do the work even when it was offered free of charge; but when they saw the satisfactory job that was being done for neighbouring proprietors, they eventually asked to be included in the scheme. Personally he thought it was a lead along these lines they ought to follow.

Mr. JAMES DICKSON (Johnstone) felt he must compliment Mr. Bell on the very fine note he had struck in his paper. It was quite true that they ought to belabour the plumbers and the so-called gasfitters; but while this was so, he did not think the plumbers were quite as guilty as some of the hardware dealers who retailed burners and mantles at 10½d., and other fancy prices. There was no kind of gas at all that would give satisfactory results in these things. He had taken out some figures to show what they were doing in his town, with a view to trying to keep their lighting load. Mr. Bell referred to the showroom as probably the best advertisement, while Mr. Wilson took the view that a satisfied consumer was the most striking advertisement. He was prepared to agree that a good showroom resulted in large measure in a satisfied consumer. He did feel that the larger towns had not given the industry the lead they ought to have given in the way of street lighting. After all, street lighting was one of the best advertisements. He deplored the fact that the large towns seemed to have given over their main thoroughfare lighting entirely to electricity. He could recall that some years ago Bath Street was one of the best gas-lit thoroughfares in the city of Glasgow. There were high-lights and standard poles at intervals, but these seemed to have disappeared in favour of electric lamps. In Johnstone he had fought electricity, and had been successful. He had succeeded there in getting one mile of the main street lit with high-power copper-cased lamps of the type known as "4" and "5." These were No. 2 mantle lamps with wide reflectors. They were 15 ft. high and spaced about 50 yds. apart, with a total candle-power of 15,600, which was equal to one candle per 13 superficial feet of surface. This was a conversion to be proud of, especially when it was borne in mind that the figure of 15,600 c.p. went against 3600 c.p. displaced in the old system. Under the displaced lighting scheme, they were paid for 300 c.ft. for the 3600 c.p., whereas now they were paid for 390 c.ft. of gas with 15,600 c.p. It would therefore be seen that 30 high-power lamps now took the place of 60 square lanterns of old-fashioned type, and for an increased gas consumption of 30 p.ct. the illumination was increased more than four times. So far as shop lighting in Johnstone was concerned, they had retained about 50 p.ct. of it for the gas industry. During the war electricity had every opportunity to forge ahead. As a matter of fact, it was forced upon committees by the Government then; and in Johnstone, because of this and other reasons, 50 p.ct. of the shop lighting had to date been lost to the gas undertaking. He meant to hold on to the remainder. On the general question of street lighting, he would like to say that, if they were going to get this business in the right way, they must put more energy into it and follow, even with some measure of stringency, the lines Mr. Bell had adopted. So far as shop lighting was concerned, he had had one recent experience which might be of interest to narrate. An undertaking of considerable size, with about a dozen branches, had been entirely retained for gas. He had shown that concern what gas could do. He had gone very much in the direction of effecting a revolution in shop lighting in the experimental case. It was evident that he had been able to give a practical demonstration of the pleasing appearance of the fittings and the diffused and almost daylight effect of the lighting. He was merely recounting incidents within his own experience. So far as domestic lighting was concerned, they had very little trouble in fighting electricity. On the part of some consumers there had been a slight wavering towards electricity; but where that happened they invariably found—he believed he was entitled to use the word "invariably"—that what they lost in lighting was more than retrieved by heating appliances. Only a small percentage of the load had been lost in domestic lighting, because cables for a supply of electrical current were difficult to lay in isolated cases, and incurred a good deal of expenditure. The expense involved to the electrical concerns was bound to be disproportionate to the results achieved. He endorsed everything in the two papers regarding the plumbers; and he homologated all that the President had said about the laying of pipes and the control of services right up the meter. Twenty years ago—or nearly so—the undertaking he was responsible for took charge of the service pipe right up to the meter. He felt that additional powers would yet be required before it would be possible for the undertakings they were connected with to be responsible for the whole application of gas from the retort to the burner. He thought this was the ultimate end to which they would arrive.

Mr. H. H. GRACIE (Edinburgh) said it did seem to him that the crux of the whole situation lay in this—that those responsible for gas undertakings must get into the consumers' houses, examine the fittings and appliances there, and regulate them. Then they must endeavour to get hold of a simple burner—they could call it a standard burner if they liked—and in this way try to eliminate the large number of useless articles that were on the market at the present time. In regard to what Mr. Dickson had said about public street lighting in the large towns, he could not altogether agree, because taking his own city, Edinburgh, the only main thoroughfares lit by electricity were the tramway routes. The other streets were lighted by gas, and would continue to be so well into the future. It was of great interest to note that all the public concerns throughout the city were lighted by means of gas. He agreed with Mr. Keillor about the maintenance of the lighting load. It was something that ought to be retained; and in the city of Edinburgh alone he presumed that the lighting load must be responsible for a revenue of from £20,000 to £30,000 a year. In regard to maintenance schemes, those which were made chargeable on consumers did not in the end prove very effective. They had one such scheme in Edinburgh. It was one which had been in operation for a considerable time, and where they made a small charge for cleaning and adjusting a burner, and it had not been taken advantage of to any extent. In regard to the supervision of appliances beyond the meter, he thought the conferences between the Board of Trade and the gas industry—through the National Gas Council—would result in authority being given to gas undertakings to make provision for interior piping, and to see that it was kept in proper order. In regard to this matter, he understood it was the intention to give authority to gas undertakings to replace appliances where they were dissatisfied with them, or where there was a feeling that they were dangerous.

Mr. C. W. FAIRWEATHER (Kilmarnock) remarked that the point that occurred to him was that they were assuming a great deal of extra responsibility if they decided to supervise gas-fittings in the interior of dwelling-houses. Then, on the question of street lighting, their gas-lighted streets compared very favourably with those that were electrically illuminated; and an important point to be remembered was that they were much less costly. So far as difficulties with the consumer were concerned, most of these arose because of the burners. The class of burner in general use and sale had a great deal to do with the whole question. If some arrangement could be entered into with the plumbers and gas-fitters for the standardization or general adoption of a good class of burner, it would go a long way towards curing the present trouble. Then the question of efficiency of distribution, while it was not a subject that had bulked largely in the past, was one that had got to be faced in the future.

Mr. DAVID FULTON (Helensburgh) said that at the Spring meeting Mr. Stones delivered what was a very slashing attack on the supposed inertia of gas managers in Scotland in regard to the lighting load. On that occasion he (the speaker) ventured to rise—perhaps inadvisedly—to say a few words on behalf of the gas manager. He was astonished to find that his reply to the lasbings of Mr. Stones had been misunderstood; and he had actually been accused of being a funk. He still adhered to his point—namely, that the gas managers of Scotland were to some extent the victims of circumstances. Let the fault be where it may, surely no good could come to the gas industry by merely miscalling electricity. There was no denying the fact that electricity

often offered great advantages in regard to points of convenience and flexibility. Moreover, in many cases it was supplied at a very cheap rate—indeed at a rate substantially lower than the price of gas in a particular district. In speaking to-day he wanted also to refer to an editorial in the "Gas World" which followed on his remarks at the Spring meeting. It was apparently written by an extraordinarily self-complacent Sassenach [Laughter], because he bemoaned the backwardness of Scotland, and seemed to think that all was well in England. Now he wanted the writer of that editorial to know that when Mr. Stones read the paper, he said to him (the Secretary): "Do not think, Mr. Fulton, that I am merely speaking of Scotsmen in this paper. I am speaking of the whole country, because those on the other side of the border are just as bad." So far as the two papers read that day were concerned, it seemed to him that the authors were not at all in dispute with each other or with the general trend of feeling. For instance, he assumed that all the members of the Association present were agreed that some system of maintenance was necessary. At the same time, they ought to have something more in the way of details. It would be recalled that Mr. Stones told them that in Glasgow their scheme was to overhaul burners and fittings; but what suggested itself to his mind was that there was rather too much high frequency about that kind of maintenance. Of course, this was a point which managers in dealing with a maintenance scheme would have to consider for themselves. Then there was a further point; and it had been mentioned in the course of the discussion. There seemed to be an idea that if a man substituted electricity for gas in the matter of lighting, he had done so because he was dissatisfied with gas. This was not the case. Such an individual introduced electricity because it was the fashion to do so; and fashion was one of the absorbing passions of the world. As an example of this he might instance a case that came within his own purview. He was at pains—and some expense—to satisfy a consumer. In the end he provided him with a first-class and tip-top job. The customer was eminently satisfied with it, and indeed gave him that positive assurance; but, in spite of this, it did not prevent his spending £400 a little later in putting in an electrical installation. This was a customer who, on his own admission, had no fault to find with gas. The position simply was that he wanted electricity, and was prepared to pay for it. Speaking for himself, he (Mr. Fulton) had failed to discover the frame of mind that would get over this kind of argument. In fighting electricity, they ought to go out to give a supply of regular composition and at regular pressure. He had not a great deal of sympathy with those who said that they could not keep the pressure very regular. It seemed to him that there was no difficulty at all in managing to do so. Finally, there was bound to enter into consideration the question of price; and unless the price was right, they had not a very good case. In some instances he was well aware that the price was far too high, especially when they had regard to the inefficiency of production. It could not be argued that he was one-sided in his views, because he was now actually arguing against the gas manager. If they were to make headway in the matter of the lighting load, they must go-in more extensively for publicity. There was no question that the electrical movement had a very fine propaganda. They had admittedly many agents at work; and they were all believers in publicity. Unquestionably, if they wanted to influence the public mind, there was nothing like advertising and publicity.

Mr. JOHN FRASER (Glasgow) said that gas managers were very slow up and down the country to take the blame upon themselves for the introduction of electricity. In many instances he was ready to concede that managers were powerless to get the appliances they wanted introduced into houses. Mr. Fairweather had reminded them of the heavy additional responsibility which would be incurred if gas undertakings became responsible for the internal fittings of a house. Admitting the responsibility, he did not see why it could not be done. There was no reason why gas undertakings should not be responsible from the retort-house right to the burner. In the city of Glasgow he believed that every water tap to be used in any property must pass through the hands of the Department. In his particular district, there was a multiple grocer's shop, where the proprietor would have no scruples whatever in introducing electric light if he thought it would be a good advertisement. The shop was one of the finest lit shops in Glasgow, and it was gas-lit. So far as street lighting was concerned, there was a district not far from the centre of Glasgow where Mr. Stones had produced a remarkable and most striking effect. If any of the members had an opportunity of travelling down to Rooken Glen, they could see the effect for themselves.

Mr. JAMES BELL replied briefly to the points raised in the discussion. Mr. Richmond, he remarked, took the view that every individual ought to be saddled with the cost of any work that was done for him in the way of maintenance. In his paper he (the speaker) had touched upon the fallacy of this; and he had been supported in his attitude by some of the other speakers, particularly Mr. Gracie. The arrangement of making the individual pay for maintenance had been tried and found wanting. They must aim at something more progressive so as to give satisfaction. The difficulty raised by Mr. Richmond about large consumers objecting to pay for the maintenance of small consumers was one that could be got over if they followed out the idea explained by Mr. David Vass. Something had been said by the President about the provision of service pipes for the various tenements, houses, &c. If he remembered aright, when he was in the service of Edinburgh Corporation over twenty years ago, it was the custom then to lay the service-pipe from the main road to the top of the staircase, and to convey the branches from that into the respective houses. As far back then as twenty years ago, that was the principle followed by the Edinburgh Corporation; and he presumed it would be continued yet. It was the duty of all the members of the Association to adopt the same policy. Mr. Keillor had expressed the view that the papers read that day had not been fruitful enough in the way of suggestions and hints as to how things could be done. He (Mr. Bell) thought he had formulated a definite policy. At all events, it would be conceded that it was pretty clearly put. A suggestion had been made by Mr. Keillor for the monthly collection of accounts; and he personally was ready to agree that it was a point which was worth considering. There was something to be gained by keeping in regular and constant touch with consumers. Mr. Vass had scored quite a good point when he referred to the practice in operation in Fife, where the large consumers were paid a good discount. Mr. Dickson had spoken strongly in favour of good public lighting. In the town of Johnstone Mr. Dickson had admittedly done a lot of good work. He (Mr. Bell) agreed with all that had been said in the discussion as to internal piping. He did think they should try to get powers so that the piping and other things would be under their control and supervision. If they could improve conditions for the consumers, they ought to do so by all means. No doubt, in instances where the cost was going to be abnormally high, they might get reasonable consumers to bear a part of the burden. By taking up this line, consumers would be helping themselves as well as the gas undertakings.

Mr. JOHN WILSON rather took it from the remarks made by Mr. Richmond that that gentleman did not think the lighting load was worth bothering about. With this view he entirely disagreed. Mr. Richmond had argued that there was little good in going in for a tenement scheme simply for the benefit of a few tenement houses. Maintenance was a bigger subject than that. It was something that included supervision. As a matter of fact, the real name for maintenance was "satisfaction." He agreed with everything the President had said as to the need for legislation so that gas undertakings might have control of gas piping. To his mind it was a pity that a provision along these lines had been left out of the Gas Regulation Act. He did not think they had been far-seeing enough when they allowed it to go. Something had been said in the course of the discussion about the blackening of ceilings; but if they fitted perfect burners they would have no trouble at all in this respect. Where he (Mr. Wilson) was located, the lighting load in the summer time was 40 p.ct. Forty p.ct. was something that could not lightly be thrown aside. He felt that Mr. Dickson was to be highly complimented on what he was doing; and if members would only take a leaf out of his book, there would be little cause to bemoan the fact that they were failing to retain the lighting load. Something had been said about the adoption of a standard type of burner; and an idea of this kind had been running through his mind. Still, he was not altogether a believer in standard types of everything, because in some cases it meant stagnation. He thought it would be rather a pity to agree on standardization just at the moment, because in regard to the manufacture of burners they were still progressing, and new ideas were being brought out. He agreed with Mr. Fulton that there was nothing to be gained by abusing electricity. What they ought to do was to make gas lighting the fashion; and they should see to it that they provided consumers with decent light and maintenance. In his own district, so far as shoplighting was concerned, they had been somewhat hard hit by the electricity department. Representatives of that department went round shop after shop actually badgering the people to take electric light. He was pleased to be able to say that latterly they had been getting some of that lighting back. Evidently shopkeepers were beginning to discover that electricity was not all that it was cracked-up to be.

Mr. JAMES RICHMOND said he was afraid Mr. Wilson had misunderstood him. Neither in anything he had said or inferred could he be represented as being a believer in the idea that the lighting load should be disregarded. He would not like the statement to go out to the Press that he was one of those who totally disregarded the lighting load; and therefore he took the first opportunity of correcting it.

Mr. WILSON remarked that if Mr. Richmond gave him the assurance that in his view the lighting load should be retained, then he was perfectly happy.

The discussion was at this point closed, and votes of thanks were passed to Messrs. Bell and Wilson.

Mr. A. S. NISBET, of Paisley, then read the following paper:

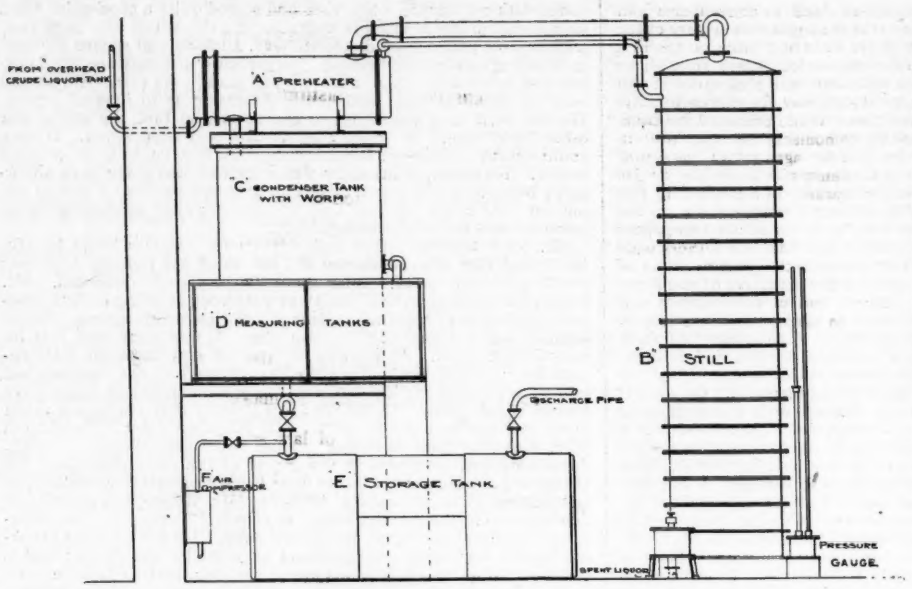
THE CONCENTRATION OF AMMONIA LIQUOR.

I have been asked to speak for ten minutes on a subject always of general, and at the present moment of particular, interest to gas undertakings which have no means of working-up their crude ammoniacal liquor into either sulphate of ammonia or concentrated ammoniacal liquor. It is hoped that what little I am able to say will lead to helpful interchange of view on a matter which vitally affects the revenue of any gas-works. I shall first describe the plant in use at Paisley for the manufacture of concentrated ammoniacal liquor, and then say a word regarding capital and working costs.

Until a comparatively recent date the liquid result of coal distillation was in Paisley simply sold at a price per ton of coal carbonized—that price being fixed for each year by the rates obtaining in a selected week in June for certain tar derivatives and for sulphate of ammonia. In 1908, however, it was decided to put down a plant capable of making 4 tons per day of sulphate, and also plant for the manufacture of concentrated ammoniacal liquor; the still being placed between these plants so that the gases might pass to either. As it happened, the contractors (friends of many years standing) to whom the products were sold preferred to take the concentrated liquor, as more suitable for their particular business—the manufacture of liquor ammonia—so that very little sulphate has been made at all in Paisley. The contractor's choice was a matter of equal suitability to the Corporation, because the sulphate house is so situated that there is no approach to it for vehicles, either horse-drawn or mechanically propelled, and all the sulphate made had to be brought on a small bogie a distance of about fifty yards before it could be loaded for dispatch.

The concentrated liquor plant [see overleaf] consists of—

(*a*) Preheater.
(*b*) Still of the ordinary type.
(*c*) Condensing worm sitting in a water tank.
(*d*) Measuring tank.
(*e*) Storage tank.
(*f*) Air compressor.



The still does not call for any comment; its form being perfectly familiar. The preheater consists of alternate gas and liquor sections made of cast-iron, as was also the worm in the earlier designs of the plant. This type of preheater has always been troublesome, because the still gases are vicious, and any flaw in the casting was quickly attacked by the cyanogen present, with the result that leaks occurred readily between the gas and liquor sections, with consequent rapid weakening of the strong liquor. The worm was similarly attacked; and in a recent renewal of the plant the preheater is of tubular boiler design—the liquor passing through the tubes being heated by the surrounding gases—while the worm is made of antimoniated lead. These changes are responsible for improved results, and one looks forward to much steadier working than the first plant afforded. In the early days it was thought that all the gases would be condensed, and that there would be no need either to cover the measuring tanks or to have a purifier to prevent escape to the atmosphere of harmful gases. But this pleasant hope was early dispelled; and a start could not be effected until provision had been made to measure the liquor in chambers tightly covered, and also to trap the sulphuretted hydrogen before it could reach the atmosphere.

Concentrated ammoniacal liquor is a very complex mixture. In a sample containing 15·31 p.ct. of ammonia by weight there were the following salts of ammonia:

Sulphide $(NH_4)_2\,S$	1·56 p.ct.
Carbonate $(NH_4)_2\,CO_3$	35·80 ,,
Thiocyanate $NH_4\,CNS$	3·65 ,,
Thiosulphate $(NH_4)_2\,S_2O_3$	3·92 ,,

Any one who has had experience of it will appreciate the desirability of avoiding unprotected acquaintance with it.

The manipulation of the plant is particularly simple and flexible. It can be shut-down or started-up as may be necessary or convenient at week-ends. Twenty minutes' preliminary steaming is sufficient to make it ready for use; while a similar period of steaming clears it out and enables it to be shut-down. Reasonable care is, of course, necessary to avoid crystallization of carbonate of ammonia in the gas passages and in the worm, but a little experience gives the operator the requisite skill.

In Paisley, crude liquor of 3·75° to 4° Tw. containing 1·44 p.ct. NH_3 is brought up to 22° or 23° liquor containing 16 p.ct. NH_3. The strong liquor so obtained is titrated with normal sulphuric acid and the ammonia content by weight determined. A simple calculation reduces it to sulphate equivalent, on the cost of which the price for the liquor is based. For instance, 1 c.c. of concentrated liquor at 60° Fahr. requires ordinarily 9 c.c. standard sulphuric for neutralization. Then since each c.c. of the sulphuric acid represents 0·017 gr. of NH_3, there are 9 by 0·017 gr. or 0·153 in 1 c.c. of concentrated liquor, which therefore contains 15·3 p.ct. of NH_3 by weight subject to the slight correction for specific gravity as determined by Twaddel's hydrometer. It is desirable to standardize the sulphuric acid either by titration against pure sodium carbonate or by precipitation with barium chloride, because acid bought as "standard normal" has proved to be slightly variable.

It was originally intended to clarify and use for coke quenching the waste liquor effluent from the still; but the process, involving sulphurous acid production and the use of copper sulphate, was so troublesome that it was abandoned. The brick tower in which the acid was made from either waste still gases or from spent oxide of iron could not be kept tight, and the effect of escaping acid fumes on adjacent ironwork was very hurtful.

The fixed ammonia is a very small proportion of the whole, and its extraction did not pay for the labour and expense attached to the removal of spent lime to the refuse tip.

All that I have said is only of general interest, and describes briefly a plant which is peculiarly suitable to Paisley with its outlet for concentrated liquor. What is of more importance to members who are now selling the crude liquor, is the prospect of remunerative adoption of either sulphate or liquor plant. Installation costs are still high; and one hesitates before incurring fresh capital expenditure, in the hope that ere long they must come down. But the cost of a sulphate plant to produce (say) two tons per day is not a very serious matter. Such plant would cost probably £1400 to £1500 erected complete; while concentrated liquor plant, capable of handling the same amount of liquor, could be put down for rather less than half that cost, but there might then be difficulty in finding a suitable market for the liquor. So far as working costs are concerned, either plant could be operated by one man, though it would probably be necessary in the case of sulphate to give assistance for bagging and loading, while the maintenance costs of the sulphate plant would also be higher.

In the case of sulphate, the maker is, through the agency of the British Sulphate of Ammonia Federation, relieved of any anxiety as to the marketing of the product, and he is further assured of getting a price which is the average over a fairly long period. Decision in the matter of plant to be adopted would be governed (I should say) by the prospect of remunerative sale for the product in any particular district. It suits Paisley to make liquor because the market for it is almost at the works' gate; while in a works not so situated, a liquor plant would not be at all an attractive proposal for want of advantageous outlet.

At the present moment I think the cost of railway carriage to distillers' works leaves very little out of the price paid for liquor, and concentration would provide considerable relief by reduction in bulk. It takes 10 gallons of crude liquor containing 1·44 p.ct. of NH_3 to make one gallon of concentrated liquor containing 16 p.ct. of NH_3, while the weight is increased only by 10 p.ct. So here at least is the prospect of saving, if suitable plant, new or second-hand, is available.

I am conscious that these general remarks offer but little in the way of solution to those in doubt. If, however, they call forth any expression of opinion, something more helpful may emerge for those who feel that they might get better revenue from their liquor than sale in its crude state provides; and such information as I can give to anyone interested is at the inquirer's service.

Discussion.

Mr. S. B. GLOVER (St. Helens) thought that the question of the disposal of ammoniacal liquor from gas-works was one that would force itself more and more upon their consideration in the future. Mr. Nisbet was to be congratulated on the success of his scheme in Paisley for the disposal of the strong concentrated liquor. He was ready to suppose that the geographical position of Paisley was an advantage. The author did not explain how he disposed of the objectionable compounds that were left after the distillation of the crude ammoniacal liquor. In the course of his long experience, he (Mr. Glover) had tried some such similar process as Mr. Nisbet had done for the disposal of the liquor, and he knew that if they had any regard for their neighbours, they must purify the gases. As a matter of fact, he believed they were compelled to take such a course under the Act now. If Mr. Nisbet was not betraying any secrets from Paisley, it would be valuable to tell the members what he considered the best way of dealing with the objectionable remainings.

Mr. JAMIESON (Edinburgh) said the experience he had gained in this matter had been derived at Greenock. There the process followed was very similar to that explained by Mr. Nisbet. It could not be said there was a market to permit of every works making concentrated liquor. At the same time, he was bound to agree that Mr. Nisbet's paper was a most interesting one. It would undoubtedly add to the value of the contribution if the author would state actual working costs obtained on his plant.

Mr. DAVID FULTON (Helensburgh) said it might interest members to know the idea that was in his mind when he asked Mr. Nisbet to read this paper. It was not so very long ago that probably three fourths of the small works were running their ammoniacal liquor to waste. The marketable value of the liquor was so low that the railway carriage costs swallowed up everything. It was considered cheaper in these circumstances to run the liquor into sewers, &c., rather than rail it off to distillers. With this in mind, he had an idea that it might be possible for small works if they could decide on a plant—not necessarily new, if a second-hand plant could suit the purpose—capable of concentrating their liquor to some extent. He considered that in the end such a plant would be a great advantage in the matter of saving railway carriage. A little still was not difficult to construct; and, as a matter of fact, there were many second-hand ones on the market from time to time. The outfit was one which should not be beyond the resources of the ordinary gas-works, if the manager was sufficiently alert and knew what he wanted. He had asked for the paper so as to suggest a line of thought to managers who were placed in the position that many were two or three months ago. To some extent, he hoped the paper had fulfilled its object. It seemed absurd that

liquor should be railed at a low percentage; and it might be possible, in a fairly cheap way, to concentrate it at least to a higher strength.

The PRESIDENT said he felt the author was to be thanked for coming forward with this paper at the present time. Most of the works now had a complete installation of sulphate of ammonia plant; but in his paper the author had brought the problem before them whether they were producing in the best manner or not. While there might never be such a large market for concentrated ammoniacal liquor as for ammonia in the form of sulphate of ammonia for agricultural purposes, still there was bound to be some sort of a demand.

Mr. NISBET, in reply to Mr. Glover, remarked that everything was dealt with quite easily in Paisley at present. As a matter of fact, everything was allowed to go to the drains. Glasgow people, however, were now beginning to object to the filth which was being poured into the river at Paisley; and the time might come when there would require to be a new expedient. With regard to cost, it was just about the same as an ordinary sulphate plant. He was grateful to the members for the reception they had given to his paper.

ELECTION OF OFFICE-BEARERS.

The SECRETARY announced that the ballot-vote disclosed that the new officials for the ensuing session were as follows:

President: Mr. John W. M'Lusky, Glasgow.

Vice-President: Mr. John Wilson, Motherwell and Wishaw.

Members of Council (two vacancies): Messrs. A. S. Nisbet Paisley) and George D. Keillor (Greenock).

Auditors: Messrs. Spalding and Muir, Glasgow.

THE SPRING MEETING.

The PRESIDENT said Mr. J. W. M'Lusky, the new President, had been obliged to leave early in the forenoon so that he might attend an important meeting in Glasgow. Before his departure, however, he had suggested the Spring meeting might be held in Glasgow. Mr. M'Lusky was not in a position as yet to make any recommendation with regard to the annual meeting, and perhaps it would be as well to postpone a decision on this point until nearer the time.

The meeting approved of this course.

THE ASSOCIATION'S GOLD MEDAL.

The gold medal of the Association was thereafter presented to the retiring President by Mr. C. W. Fairweather, of Kilmarnock. Mr. Smith feelingly acknowledged the gift.

VOTES OF THANKS.

On the motion of Mr. S. MILNE (Aberdeen), the usual votes of thanks were passed to the authors of papers, to the scrutineers, and to the President. The proceedings then terminated.

SOCIAL FUNCTIONS.

The social side of the annual meeting of the Association is being fostered and strongly developed.

BOWLING AND GOLF COMPETITIONS.

On Wednesday bowling and golf tournaments were promoted. Both ventures were conspicuously successful, the entries being numerous. The golf tournament was decided at Gleneagles; and the winner of the silver rose bowl was Mr. William Cumming, of Dunblane. The other prizewinners were: Messrs. Alexander Mackenzie (Dunblane); F. W. Richmond (London); Jas. Stevenson (Elie); R. B. Waddell (Polmont); A. Young (Tayport); J. A. Penman (Glasgow); J. W. Scott (Manchester); H. Rule (Kelty); and T. Carmichael (Portsmouth).

The bowling tourney was played over the Liveyland Green, and five rinks competed. The prizes were won by a rink skipped by Mr. Allan Reid (Brechin). His supports were Messrs. Robinson (Annan), Ireland, and Wm. Marr, of Stevenston. Mr. Marr is to be congratulated on the splendid success of this year's bowling tournament.

During an interval in the proceedings on Thursday, the silver rose bowl was presented by the President to the winner of the golf tournament (Mr. Cumming, of Dunblane).

In the evening the members of the Association were entertained to dinner in the Golden Lion Hotel by the Chairman and Directors of the Stirling Gas Light Company. This function was a most enjoyable one.

On Friday, the members of the Association, accompanied by their lady friends, enjoyed a charabanc outing to Crieff. The outward journey was made round the Ochil Hills and the return trip by the beautiful village of Dollar, where Castle Campbell was visited. Luncheon was served in the Star Hotel, Crieff. Favoured with genial weather, the excursion was voted by all to have been an outstanding success.

American Gas Patents.—Mr. Frederic Egner incidentally mentions, in the course of a letter to the Editor of the "American Gas Journal," that, round about the year 1885, he bought copies of all American gas patents, beginning with the first—namely, the one issued to David Melville, of Newport (R.I.), on March 18, 1813, for "An Apparatus for Separating the Hydrogeneous Gas or Inflammable Air from the Carbon and Less Volatile Ingredients of Pit Coal." The total number, at the date of his purchase, had come to be more than 1200. All of these he carefully read and catalogued, continuing this process until April, 1890, when the total gas patents had reached 2500. Then the work of redesigning and reconstructing the Standard Gas-Works of New York City left him no time for other labours.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Discussion of the Institution Education Scheme.

A Special General Meeting of the Association was held at the Westminster Technical Institute, Vincent Square, S.W., last Friday, to hear an address by Mr. Walter Hole on the Institution of Gas Engineers Education Scheme.

Mr. D. CLEAVE CROSS (the President), in opening the meeting, said that, though the Institution Education Scheme was explained to members of the Institution of Gas Engineers and others some time ago, he did not think many of the members of the London Junior Association were able to be present at that meeting; and arrangements had therefore been made for Mr. Walter Hole, the Organizing Secretary for the Education Scheme, to give a brief explanation of it at a meeting of the Juniors, and then for the members to put questions to Mr. Hole and criticize the scheme. At one time it was hoped that the matter could have been dealt with earlier in the year; but there was not an opportunity for another meeting at the end of last session, and it was therefore postponed until the beginning of the 1923-24 session. In the meantime, however, it was felt that the matter was such an important one that a special general meeting ought to be called to deal with it. He did not know whether Mr. Hole was going to refer to one point; but he himself wished specially to mention the work of three of the members of the London and Southern Junior Association in connection with the education scheme—Mr. J. G. Clark, Mr. S. B. Chandler, and Mr. E. L. Oughton, the last-named gentleman having only just joined the Association. Personally he sometimes felt that the Juniors did not receive all the credit they deserved in connection with the scheme. As a matter of fact, very little credit had been given to them; but they had had a lot to do with the scheme, and credit ought to be given where it was due.

Mr. WALTER HOLE said he was going to be venturesome enough to disagree with the President at the very outset, and that was with regard to the suggestion that insufficient credit had been given to the Juniors for the work they had done in connection with the scheme. He happened to know that this was directly contrary to the truth. As far as he could be taken as the mouthpiece of the Advisory Committee who had the management of this scheme in hand, he had every confidence in saying that the Committee recognized to the full the inestimable service which the Junior Associations throughout the country had done during the past few years in bringing this matter of education to the fore, and in giving a lead of which the "old fogies," of whom he regarded himself as one, were absolutely in need.

Coming to the details of the scheme, Mr. Hole said he only intended to explain it briefly, and then to leave it to those present to question him as fully as they pleased. Explaining how the scheme was divided into two parts, he remarked that the gas students throughout the country could be divided into two groups—those who had the advantages, which existed in London and a few other places, of ample facilities for training at technical institutes, and those who were in parts of the country where these facilities did not exist. Dealing with the first class of student, he said the scheme took them up as juniors coming on the works at the age of 15, 16, or 17 years, and prescribed a three years' course for the preparatory training for the ordinary certificate, two of which years would be taken-up in the study of ancillary subjects. If the student was a gas-engineering student, these first two years would be devoted to mathematics, chemistry, mechanics, &c. If the student was a supply student, the first two years would be devoted to mathematics, chemistry, physics, &c. Then, in the third year, sole attention would be given to gas engineering or supply, as the case might be. One of the difficulties which he had experienced when he was an Examiner for the City and Guilds of London Institute was the inability of so many of the students to relate the questions set to the underlying scientific principles. Supposing it were a simple question of the combustion of gas, some of the students had no more idea than a lamp-post of the principles underlying combustion; and therefore those who had worked-out the present scheme regarded it as of the greatest importance that there should be a thorough grasp of the fundamental principles. After the student had obtained the ordinary certificate, there was a further two years' course, the first of which would be primarily devoted to a further study of the ancillary subjects, while the second year would be mainly allotted to the principal subject of gas engineering or gas supply. The student would then sit for the higher certificate, and the way was clear for him to study for the diploma.

Before dealing with the diploma, however, Mr. Hole had a word to say concerning the students who had not the facilities of a technical institute. As last year there were in the whole of the country only eleven institutes with gas-engineering courses, it would be seen what an alarming proportion of gas students there were who came within the second category he had already mentioned. Even in 1913, which was the high-water mark as far as gas courses were concerned in recognized technical institutes, there were only 27 institutes; but when they took out London, Yorkshire, and Lancashire, there was very little left for the rest of the country. There was Birmingham, of course; but if a line were drawn from Birmingham to Manchester on the one hand,

and Birmingham and Sheffield on the other, there was, apart from London, very little in the way of gas-instruction facilities south of these two lines. There was nothing whatever in the Eastern Counties; and in the Southern Counties from Dover to Penzance, he believed there was one institute. Thus it was that Section 2 had been introduced into the scheme, under which any student who could satisfy the Advisory Committee that he was out of touch with an institute giving instruction in gas subjects, might study the ancillary subjects at any institute in his neighbourhood, and then later, having attained the required proficiency, ask to be examined in gas supply or gas engineering. The Institution would then forward an application form, which could be obtained from Mr. Dunn or himself; and the Institution of Gas Engineers, working through the District Associations, would arrange for convenient examination centres for these students. This procedure applied to both the ordinary and the higher certificates. The only difference was that, in the case of students trained at a recognized institute, the Board of Education endorsed the certificate; while in the case of students coming under the second part of the scheme, the Board of Education would not so endorse the certificate. But the effect from the point of view of the value of the certificate to the student was negligible.

Coming to the diploma course, which followed the obtaining of the higher certificate, there was first the requirement that the student must not be under 23 years of age; and the reason was that the diploma was intended to be not simply a certificate of academical proficiency, but evidence that the holder of it had been through the mill on the works or in the distribution department. It was designed deliberately to exclude the man who was a mere book-worm. He wondered whether he himself dare make a confession. Many years ago, when he sat as a student for gas engineering, he got first-class honours; but his knowledge of the works had not been practical so much as reading knowledge, because all his life he had been on the distribution side. Of course, he had a "nodding acquaintance" with what went on in the works; but it was intended now to knock this out, and he thought quite rightly. It was for this reason that the diploma examination would be partly written and partly oral; and the oral portion would be in the hands of three gentlemen who had already been appointed. He was perfectly certain that, if he had been confronted with three such men when he took his gas-engineering examination years ago, he would have fallen flat. It was desired now that the diploma should be a really valuable certification; and therefore there had to be a certain amount of training on the works and in the distribution department before it could be taken. The diploma, too, was intended for those who were aiming at the higher administrative posts in the industry; and such men must have a working acquaintance with the practical side. Before a man could go forward for the diploma, he must possess the higher certificate in both gas engineering and gas supply. In addition, a certain minimum standard of general education had been set——viz., matriculation or its equivalent in any recognized British university. Finally, as part of the diploma examination, the student must write a thesis on some aspect of his daily work.

Referring to one or two criticisms which had already reached him, Mr. Hole mentioned a case of an assistant engineer who had taken first-class honours in gas manufacture and second-class in gas supply, who had matriculated, and was a member of the Institution of Gas Engineers, and thought he was entitled to his diploma. The answer, said Mr. Hole, was that nobody was entitled to the diploma who had not earned it; and everybody who wanted it must sit for the examination. Another point was as to examination centres; but this could only be settled after the application forms had been received, in order that the distribution of the students might be ascertained and the centres determined upon accordingly. It would be useless to decide upon certain centres, and then to find that the bulk of the students were clustered a long distance away. Again, no doubt, they had seen that the City and Guilds of London Institute were advertising a gas-engineering examination to be held next May; and he had been asked for advice as to whether a student should take this examination or the Institution examination. It appeared to him that this was a question which answered itself. If there was a choice between a certificate granted by an outside body like the City and Guilds of London Institute and one granted by the Institution of Gas Engineers, it did not seem worth a moment's consideration as to which a student should take. At the same time, it would be seen in the printed draft of the Institution scheme that the examinations of the City and Guilds of London Institute and the Institution of Gas Engineers were associated during a transitional period of not more than five years, so that a student who passed during that time equivalent examinations of the City and Guilds could sit for the Institution diploma. The point to be noted, however, was that this was retrospective, and not prospective. It applied to certificates already gained, and not to those to be gained; and this had a tremendous bearing on the matter of choosing which examination to take.

[The report of the ensuing discussion is unavoidably held-over until our next issue.]

Mr. W. J. Liberty, it is understood, has been invited by the Committee of the National Gas Exhibition at Birmingham to give, at the forthcoming exhibition, an illustrated lecture on the history of the gas industry in its connection with public lighting.

Industrial Gas Applications.

Speaking of the need of cultivating the industrial gas-heating field, Mr. B. R. Armitage told the Commercial Section of the Empire State Gas and Electric Association of America that among the many operations now performed by gas as a heating agent in the garage and repair shop are bending, welding, iron and aluminium brazing, lead burning, vulcanizing, japanning, and in connection with hot caustic solution tanks. The confectioners make good consumers, using gas for stoves, batch warmers, and urns. Small laundries employ it for drying; and rug-cleaning establishments also present good prospects. These installations have been sold in the larger cities to the repairers of oriental rugs. The washing and renovating of domestic or imported rugs is an industry found in almost every community. Rugs dried with gas come out light and soft, with each fibre of wool standing free on the warp, due to the character of the heat and absolute temperature control. Newspaper plants are not to be forgotten, with gas utilized for the lead pots of the linotype machines and the autoplate pots. Gas can also be applied to the smoking, curing, and preparing of meat and fish products, with much better results than other fuel, because of temperature control, which means less shrinkage—a big item to the packer. This lessening of shrinkage losses more than offsets the slight additional cost of fuel. The smoking and curing of fish is vastly different from that of meat, and requires special handling, and the utmost care in the matter of temperature—rendering gas the ideal fuel for this process. Plumbing and tinners' shops can be worked-up to be very good consumers. Soldering furnaces are not large consumers, but are well worth installing.

Gas for Lime Sludge Recovery.

Certain paper mills, says the "American Gas Journal," manufacture pulp by digesting raw materials with caustic soda. They produce what is known as soda cellulose. The large mills generally make their own caustic soda by the causticizing of a solution of common salt or other sodium salt with the aid of milk lime. A bye-product of this causticization process is lime sludge, which is primarily constituted of carbonated lime. This sludge is filtered, and the residue must afterwards be calcined in a rotary furnace or kiln. The process of calcination produces quicklime, which can then be slaked and used over again in the causticization process. The calcination of the lime requires heat; and inasmuch as a rotary kiln is some 100 ft. long and 7 ft. in diameter, the conditions under which this heat is applied are rather special. The real competition is between powdered coal and producer gas. Both require installations for the manufacture of the fuel in condition to be used in the kiln. There is also a possibility of employing manufactured central station gas, provided the quality and price meet competitive conditions. The interesting point in the use of gas for the calcination of lime sludges, in comparison with pulverized coal, is that gas gives a much better product than coal. In fact, experience has shown that gas possesses many more advantages than coal, and is the most logical selection, provided the lime sludges are calcined with a good quality of gas. The product is absolutely free from all impurities. The quicklime is perfectly clean, and not discoloured in any manner. It has been estimated that a ton of the recovered lime can be produced with the gas made from 600 to 800 lbs. of coal of the proper type. The point is made that it is always wise to use the best grade of gas coal obtainable.

Swansea Gas Cheaper.—The Swansea Gas Light Company have reduced the price of gas by 1·8d. per therm—namely, to 1s. 1d. per therm—equivalent to 8d. per 1000 c.ft.

Back to Gas Lighting.—The Ardee (co. Louth) Town Commissioners have, after several years' experience of electricity for street lighting, decided to return to gas, and have accepted the Gas Company's tender, which was 33 p.ct. cheaper than that of the Electric Light Company.

Tar *v.* Bitumen for Roads.—Mr. Hugh W. James, Chief of the Ordnance Wharf Tar Works of the South Metropolitan Gas Company, has been engaged in a very spirited correspondence in "Municipal Engineering" on behalf of the merits of tar macadam for road surfaces, as against bitumen. Mr. James brought forward some extremely interesting figures and facts in favour of "Tar-Mac," which should be convincing to the most sceptical.

Three Boys Poisoned by Gas.—At the colliery village of New Edlington, near Doncaster, last week, three boys, sons of Arthur Pass, a miner, were found dead in bed through gas poisoning. The boys occupied one bed in a small room upstairs; the gas being lighted for them when they went to bed, and the eldest boy Joseph, aged 13, being instructed to turn it off. When they did not come downstairs the following morning, their sister went to call them. She found the gas escaping from the bracket, and her three brothers dead. It is surmised that the accident was due to a defect in the bracket.

Belfast Gas Prices.—In the Belfast Corporation, Mr. M'Laurin (the Chairman of the Gas Committee) made appreciative allusion to the reduction of 4d. per 1000 c.ft in the price of gas, and said the Committee desired him publicly to acknowledge the efficiency with which the undertaking was administered by Mr. James D. Smith (the Engineer and Manager). The scale of charges now is: Lighting, 2s. 4d.; power, 2s.; high pressure, 2s. 5·6d.; Cregagh district supply, 3s.; slot meters, 30 c.ft. for 1d. A previous reduction in March made the net price for domestic purposes 2s. 8d., and for power 2s. 4d.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

"N.P.K." Fertilizer.

SIR,—In "Questor's" contribution appearing in your last issue are several points upon which comment might be made, but they would not have a very direct bearing upon the original subject—the experimental results obtained in scrubbing gas.

The investigation is meanwhile proceeding; and I hope that in the course of two or three months progress may be made which will justify further reference to the process. There may then be an opportunity of referring to "Questor's" valued criticisms.

Hurworth Moor, Darlington, Sept. 7, 1923. E. LLOYD PEASE.

REGISTER OF PATENTS.

Vertical Retorts.—No. 179,550.

THWAITES, R. E., of Brisbane.

No. 12,743; May 5, 1922. Convention Date: May 5, 1921.

This invention relates to continuous vertical retorts which may be operated under graduated temperatures, ranging from a low point at the head to a high point in the zone of maximum temperature immediately above the coke chamber at the bottom. It embodies means for obtaining complete control over external temperatures at every zone of the retort, further control through internal heating by hot gas, equal heating of both sides of the retort, increased throughput for given temperature conditions of the heating chamber, diminution of the tendency of coking coal to stick up due to the action of the circulating gas carrying off water and tar vapours as rapidly as formed, and full possible economy of heat. It is claimed to be equally adapted to either maximum oil or maximum gas production.

The device is adaptable either to low or high temperature carbonization of coal, for it is not necessary to work it under graduated temperatures. From the point of view of gas production, the higher the average temperature of the retort walls, the greater the throughput and volume of gas made; the throughput also will be increased by the hot gas circulation. While in practice coal would be used as the charge, it is practicable to use other solid carbonaceous fuels, such as brown coal or shale.

The primary claim is for a vertical retort having a shaft of tapered section contained in a centrally disposed septum in a stack structure and flanked by a tier of horizontally diaphragmed galleries each having gas and air services brought into it below its diaphragm, incoming air preheater flues jacketing these galleries, and eduction vents therefrom to encasing jackets leading to chimney flues.

Combined Gas Cooker and Heater.—No. 202,022.

GOSLIN, S. B., of Artillery Lane, E. 1, and HAWKINS, L., of Putney.

No. 13,023; May 9, 1922.

According to this specification the patentees claim to have invented an efficient and economical cooker-heater. It comprises a cast-iron box having a fire of refractory material (vertical tubes of asbestos) at the front and rear of a central filling of asbestos fuel. There is an atmospheric chamber for supplying gas to the front heating burner and another for supplying gas to the back and central burners of the fire; or both burners may be used together. Grilling may be carried on under the fire; guides being provided for a movable shelf.

A detachable oven is arranged behind the fire, and there is a plate or hob over the fire and an auxiliary gas ring upon which vessels can be placed for boiling purposes.

Extraction of Hydrogen Cyanide.—No. 202,024.

TAPLAY, J. G., of Streatham Hill, S.W. 2, and GALBRAITH, W. L., of Horseferry Road, Westminster.

No. 13,083; May 9, 1922.

If hydrogen cyanide be brought into contact with ammonia and sulphuretted hydrogen in the presence of a contact material, not only is the hydrogen cyanide decomposed, but it is converted into ammonium thiocyanate; and under appropriate conditions the reaction becomes cyclic and is operable as a continuous process.

According to the present invention, hydrogen cyanide is extracted by bringing the gas into contact with the bicarbonate of an alkaline earth in the presence of sulphuretted hydrogen and ammonia, for the purpose of effecting the decomposition of the cyanide with simultaneous production of ammonium thiocyanate. (By the expression "alkaline earth bicarbonate," or "alkaline earth carbonate," the patentees mean only a bicarbonate or a carbonate of barium, calcium, or strontium.)

Taking bicarbonate of lime as the contact material, it appears that the reaction taking place may be represented by the following equation:

$$CaOCO_2, OH_2CO_2 + NH_3 + HCN + H_2S = NH_3HCNS + CO_2 + OH_2 + H_2 + CaCO_3$$

It will be seen that the normal carbonate appears at the end of the reaction. By bringing the reacting gases and the bicarbonate together in presence of carbon dioxide gas and water, the process may be operated continuously. The water may be in the form of moisture contained in the gaseous mixture. The bicarbonate may be produced *in situ* by bringing the reacting gases containing carbon dioxide into contact with the carbonate of an alkaline earth in the presence of water.

The gases may be passed through an aqueous solution of the bicarbonate—for example, bicarbonate of lime—such a solution being readily prepared by passing carbon dioxide (for instance, in the form of waste flue gases containing it) through a cream of chalk and water until the former has been brought into solution. Alternatively, the reacting gases may be brought into contact, in the presence of water, with a solid alkaline earth carbonate (of other than the hard crystalline variety) in an appropriate state of disintegration, as may be required to provide an effective contact surface for the gases. A convenient contact material is calcium carbonate in solid form—for example, native chalk, which contains bicarbonate, broken to fragments of suitable size (say, to that of a hazel nut); but the hard varieties of calcium carbonate, such as limestone and marble, are not suitable for the purpose.

Care should be observed to maintain the surface of the carbonate clean, by removing deposited reaction products. This may be accomplished by washing the carbonate with a clean water spray or a spray of aqueous ammonia, such as a weak ammoniacal liquor (other than that obtained from the hydraulic main of a gas-works), from time to time as may be required, but not so often as to wash away the bicarbonate and thereby slow down or temporarily stop the reaction. The wash-water may be collected in a sump communicating with the scrubber in which the gas is purified, and neutralized in any desired manner for the recovery of the nitrogen, or other valuable products therein.

It is important that tarry matters in the gas should be completely removed prior to introducing the gas into the scrubber containing the contact agent; and if the ordinary tar-washer does not prove sufficiently effective, additional means for the purpose must be employed, for if the surface of the contact agent becomes coated with a tar-film, the reactions are impeded and finally stopped.

When the contact agent is employed in solid form, the ammonium thiocyanate is deposited upon it; and it should therefore be washed from time to time as aforesaid. The salt is then recovered in the wash-water, which, in addition, contains ammonium sulphide, ammonium carbonate, and ammonia.

As previously stated, normal carbonate appears at the end of the reaction. In the presence of moisture and carbon dioxide contained in the gaseous mixture, this salt is reconverted into the bicarbonate. Under these conditions the reaction becomes cyclic, and may be carried out as a continuous operation. It provides a simple and expeditious, as well as an economical, means for the removal of hydrogen cyanide from gases and for the cheap production of ammonium thiocyanate as a bye-product.

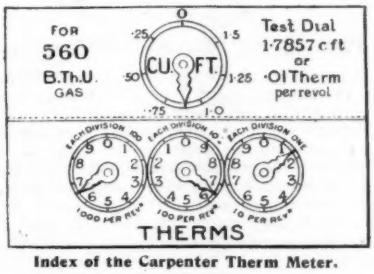
Therm Gas-Meter.—No. 202,186.

CARPENTER, C., of Old Kent Road, S.E. 15.

No. 24,827; Sept. 13, 1922.

This invention relates to a new method of rating gas-meters, the capacities of which are commonly related to some multiple or sub-multiple of a cubic foot. The invention consists in substituting for this a method based upon capacity in therms of British thermal units, and also means for adjusting the capacity in such a manner that one revolution of the measuring device discharges the volume of gas containing the energy equivalent of a multiple or sub-multiple of 100,000 British thermal units (1 therm). The invention is applicable to both wet and dry meters.

In the former type, the measuring device usually consists of a drum mounted upon a spindle and divided into three or more compartments, the capacity of which is regulated by the height of the liquid in which the drum is immersed; the counters being actuated by the revolution of the drum. In carrying out the invention as applied to this type of meter, a scale is so calibrated as to indicate the height of the liquid which will cause the meter to register the correct number of British thermal units which are equivalent to the quantity of gas of any given calorific value which passes through the meter. For example, if the gas has a calorific value of 560 B.Th.U. per c.ft., then if the level of



Index of the Carpenter Therm Meter.

the liquid be brought opposite to the mark 560 on the scale, one therm will be registered by the meter when 178·57 c.ft. of gas have passed through it. Or if the gas has a calorific value of 500 B.Th.U. per c.ft., then, if the level of the liquid be brought opposite to the mark 500 on the scale, one therm will be registered when 200 c.ft. of gas have passed; and so on. The correct level of the liquid may readily be obtained, in known manner, by employing a slidably mounted overflow pipe, the top of which is brought opposite to that mark on the scale which indicates the thermal capacity of the gas in use.

Preferably the first counter or test dial actuated by the rotation of the drum will be marked to show cubic feet, so that the meter can be officially tested in the usual manner; the other counters registering units, tens, and hundreds of therms. Preferably also the test dial will be so marked as to register in one revolution the number of cubic feet equivalent to 0·01 of a therm; the test dial being mounted on a

detachable plate containing all necessary information—for example, if the gas employed had a calorific value of 560 B.Th.U. per c.ft., the plate would be marked as shown in the drawing which accompanies the specification.

In the case of a dry meter, the spindle which actuates the counters is provided in the usual manner with an arm on which a crank pin connected to the bellows or flexible chambers is slidably mounted; and according to the invention the arm is calibrated to indicate the position in which the crank pin must be set so to adjust its throw (and consequently the extent to which the flexible chambers open and close) that the counters will register the correct number of therms equivalent to a gas of any given calorific value. Thus the meter can readily be set so as to register in terms of therms the amount of gas of any calorific value which passes through the meter and can readily be re-set to give a proper reading in terms of therms if at any time the calorific value of the gas is altered.

The test dial and indices are as shown; the dial plate being made in two parts, of which the upper part is removable and interchangeable.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 5.]

Nos. 21,575 to 22,092.

BAIGENT, W.—"Self-locking tap for gas-fittings." No. 21,817.
DAVIS, A. F.—"Gas heating apparatus." No. 21,692.
JACKSON BOILERS, LTD.—See Davis, A. F. No. 21,692.
KARAVODINE, V. DE.—"Gas-turbines." No. 21,603.
M'INDOE, R. W.—"Prepayment gas-meters." No. 22,060.
TAUNTON, R. P.—See M'Indoe, R. W. No. 22,060.
WOODALL, DUCKHAM, AND JONES (1920), LTD.—"Manufacture of coal briquettes." No. 21,673.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Chard Corporation.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

It is also proposed that an additional charge of 1½d. per therm (maximum) should be authorized in respect of gas supplied through a prepayment meter.

Huyton and Roby Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 3d. per therm.

West Staffordshire Gas Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 8s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

DECLARATIONS OF CALORIFIC VALUE.

Hawkhurst Gas Company, Ltd.—450 B.Th.U. (Oct. 1.)
Leeds Corporation.—470 B.Th.U. (Sept. 10.)
Rainhill Gas and Water Company.—500 B.Th.U. (Sept. 30.)
St. Margaret's Gas Company, Ltd—475 B.Th.U. (Oct. 1.)
Tawe Valley Gas Company.—400 B.Th.U. (Dec. 3.)

Price of Gas Discussed at Newcastle.

The proposed revision of the standard and maximum prices of gas chargeable by the Newcastle and Gateshead Gas Company is the subject of a report issued by the Watch Committee of the Newcastle Corporation. They state that upon an investigation of the Company's 1922 accounts they are advised that grounds for a reduction of the standard prices are disclosed. Negotiations had taken place between a Sub-Committee of the Watch Committee and representatives of the Company, with a view to ascertaining whether an agreed settlement could be arrived at, which could be recommended by the City Council for acceptance, and which could be submitted to the Board of Trade upon an agreed application for an amending Order reducing the standard and maximum prices per therm chargeable by the Company. The latter were originally willing to concede a reduction of the standard price per therm to 12d.; and this was subsequently reduced by the Company to 11·563d. per therm. As a result of further negotiations between the Sub-Committee and the Company, the latter had accepted the Committee's offer to recommend for acceptance by the City Council a sum of 11d. per therm; this being in the nature of a compromise, and wholly without prejudice to the position in the event of its not being accepted by the Council. The effect of the proposed settlement would be a reduction of £204,000 gross in the amount which the Company are empowered to charge against the consumers of gas, if they were to pay the maximum rate of dividend upon their ordinary stock permitted under the terms of the Order of April, 1921. If the Company maintain their present charge of 8·8d. per therm, they will be in a position to pay a dividend of £4 17s. 6d. p.ct. on their ordinary shares; this being the same as that declared at the last annual meeting for the year 1922.

ELECTRICITY *v.* GAS.

At a recent meeting of the South Shields Corporation Gas Committee the following letter (which is extracted) was read from the South Shields Gas Company:

ELECTRICITY AND GAS.

In the "Shields Daily Gazette" dated July 31, appears a statement under the above heading, which I take to be an excerpt from the minutes of the South Shields Electricity Committee.

It is reported that the Electrical Engineer made a statement in his report to the effect that "the Electrical Committee maintain the full candle-power throughout the hours of lighting, whereas the Gas Company reduce the gas pressure at a certain time in the evening." The inference to be drawn from this statement casts a serious reflection upon the Gas Company, inasmuch as it infers that during certain periods of the lighting hours the efficiency of the gas lamps deteriorates, and that the Corporation Lighting Committee pay for gas they do not receive or consume. I wish in the strongest possible terms to refute and contradict the unwarranted and false innuendo contained in the statement referred to, and I desire to point out to your Town Council that every gas-lamp in South Shields is provided with either a pressure or volumetric governor which accurately and consistently regulates the quantity of gas consumed by each lamp during the whole period the lamps are lit, irrespective of any variations of pressure in the Company's distributing mains. By the use of these governors the gas consumption and the lighting efficiency of all gas-lamps remain constant throughout the full lighting period.

I take this opportunity of stating that as from Oct. 1 next, it is the intention of the Gas Company to reduce the cost of street lighting by a further 5s. 2d. per lamp. The revised price will be at the rate of £4 11s. 2d. per lamp per annum, which is equivalent to 0·277d. per lamp per hour.

(Signed) DUGALD CURRIE,
Aug. 1, 1923. Engineer and General Manager.

SHREWSBURY GAS COMPANY.

The annual meeting of the Shrewsbury Gas Light Company was held last week—Mr. J. B. LLOYD (Chairman) presiding.

The report of the Directors showed that the net profit on the year's working, after providing for interest on mortgages, and deducting the interim dividend paid in March last, amounted to £12,504; and they recommended that a final dividend of 3 p.ct. (less tax), making 5½ p.ct. (less tax) for the year, be declared. The reserve fund amounted to £11,573; and a special purposes fund had been opened, as authorized in the Shrewsbury Gas Special Order, 1922. There had been a decrease of 3½ million c.ft. in the sale of gas during the year, which might be accounted for by the mild weather prevailing during the winter months. Following on a decrease in the cost of coal, the Directors reduced the price of gas, as from Jan. 1, by 1d. per therm, and have since made a further reduction of 2·2d. per therm, as from July 1, making the present price 11·8d. per therm. The number of cookers on hire at June 30 was 4372, together with 1290 fires. There were also 3463 ordinary and 4891 prepayment meters in use.

The CHAIRMAN, moving the adoption of the report and the accounts, said, speaking generally, the past year's operations had contributed in no small measure towards a more encouraging balance-sheet than he had reviewed for some time. On the revenue account economical working, combined with falling prices, had resulted in a reduction of £14,000 in the cost of manufacture. The items which had contributed to this figure were chiefly concerned with the retort-house, where up-to-date plant was being successfully operated—and this in spite of coal being still 90 p.ct. above pre-war cost. On the other hand the receipts from the sale of gas were £13,500 less than last year, owing to the reductions made in the charges at each half-year. The total receipts were less by £16,525, and expenditure was reduced by £17,931, thus increasing the gross profits by £1406. After deducting capital charges and reserve fund appropriation, the net profit was £422 in excess of last year, so that after payment of the final dividend of 3 p.ct. there would be £9293 to carry forward. A system of inspecting, cleaning, and adjusting consumers' fittings and appliances, without charge for time, had been put into operation, and was proving of mutual benefit to consumers and the Company. Most householders appreciated this free service, though some refused to take advantage of it.

The DEPUTY-CHAIRMAN seconded the motion, which was carried.

Mr. OWEN WILDING proposed the re-election of Mr. J. B. Lloyd as a Director and congratulated him on the Company's excellent report.

Mr. S. WITHERS seconded the motion and remarked on their appreciation of the very careful manner in which Mr. Lloyd acted as Chairman.

The motion was carried, and Mr. LLOYD thanked the meeting.

Mr. MILLAR proposed the re-election of Mr. Alfred Mansell as a Director. Mr. EVASON seconded the motion, which was carried.

Mr. A. MANSELL (Director) said he would like to take the opportunity of saying personally how much he appreciated their Engineer and Secretary, Mr. C. M. D. Belton.

Bexhill Water and Gas Company.—The accounts for the half-year ended June 30 show a balance at credit of profit and loss account available for dividend of £20,144. The Directors recommend that a dividend be declared for the half-year at the rate of 6½ p.ct. on the 1885 and 1892 capital, at the rate of £4 11s. on the 1896, 1901, and 1904 capital, and at the rate of 5 p.ct. on the 5 p.ct. preference share capital, all less income-tax. This will absorb £4478, leaving £5665 to be carried forward to the next account.

OXFORD GAS LIGHT AND COKE COMPANY.

The Annual General Meeting of the Company took place on Sept. 1, when Alderman S. W. ANSELL, J.P. (the Chairman), presided.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, stated that he particularly desired to call attention to the cost of coal, which showed a considerable reduction as compared with the previous year; set-off against this, the receipts from residual products had also declined. Revenue from the sale of gas showed a reduction of about £10,000, due to the lowering in price during the twelve months after review, although there was an increased output of 10 p.ct. The price during the period had been reduced from 11½d. per therm (or 4s. 3½d. per 1000 c.ft.) to 9d. per therm. He also mentioned that a further reduction to 8½d. came into operation last June. Owing to the increased consumption of gas, and in order to maintain a regular supply, the Directors last November, upon the advice of their Engineer, had placed an order for a new gasholder and steel tank, which it was hoped would be brought into commission before the next annual meeting. The capacity of this holder would be two million cubic feet, and it should prove a great acquisition to the Company.

Mr. W. TURRILL seconded the adoption of the report and balance-sheet.

Mr. J. FERGUSON BELL thought the shareholders ought to congratulate themselves upon the excellent balance-sheet, which reflected great credit not only upon the Directors, but upon the Engineer and General Manager (Mr. W. E. Caton) and the whole of the staff.

The CHAIRMAN proposed, and Mr. G. C. DRUCE seconded, that the statutory dividend of 5 p.ct. upon the preference shares of the Company, and a dividend of 9 p.ct. upon the ordinary stock for the half-year ended June 30 last be paid—making, with interim dividend on latter stock, 8½ p.ct. for the whole year.

The CHAIRMAN proposed, and Mr. J. PIKE seconded, a vote of thanks to the officers, staff, and employees of the Company.

Mr. W. E CATON, replying, referred to the make of gas per ton of coal, which had been maintained at the high average of approximately 15,000 c.ft. The unaccounted-for gas had been slightly reduced. The average tests of the quality of gas supplied, made by the Official Gas Examiner, showed the average calorific value to have been maintained at approximately 10 B.Th.U. per c.ft. above the quality required by law; and in no case had it fallen below the declared value. The number of consumers had increased in the past twelve months by 225, as compared with 255 the previous year. The number of cookers and gas-fires on hire and sold outright had increased by 1573. Geysers and water heaters had increased by 86. The number of slot installations fitted during the twelve months amounted to 143. The return of residuals on coal amounted to approximately 60 p.ct. The price of gas was now only 29 p.ct. more than it was in 1914.

The meeting concluded with a vote of thanks to the Chairman and Directors.

At the Extraordinary Meeting which followed, the Chairman briefly outlined the object of the Company's Application to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, 1920. He stated that when they last went to Parliament in 1892, the consumption of gas was 241 million c.ft. per annum; for the year now completed the output was 589 millions, or nearly 150 p.ct. increase. The shareholders would, therefore, understand that in order to meet this increasing demand for gas it was necessary to apply for additional powers; and the Directors were at the same time taking the opportunity of obtaining other necessary powers, and also various amendments to their present Acts which experience in working had shown to be necessary.

RICHMOND GAS COMPANY.

The half-yearly general meeting of the Company was held last week—Mr. H. PULLMAN, J.P. (Chairman), presiding.

The CHAIRMAN, in moving the adoption of the report and accounts—the former recommending the declaration of a dividend at the rate of 5½ p.ct. per annum on the consolidated ordinary stock for the half-year—said that there was a decrease of £6654 on the expenditure under revenue account. The cost of repairs and maintenance was lower by £2886; while meter repairs had increased to the amount of £225. The reduction under public lighting amounted to £262; but they had paid £601 more in taxes during the half-year. Notwithstanding the mildness at the early period of the year, gas sales showed an increase of 2 p.ct. Of course, the decrease in the price compared with the corresponding half-year—viz., 3d. per therm—resulted in a lower revenue; the net decrease being £8806. The smaller quantity of coal carbonized had naturally affected the production of coke; and this, in conjunction with the decline in prices, had resulted in a decreased revenue to the extent of £2962. Other items classed as residuals showed a healthy condition. The market for tar had been exceptionally firm throughout the half-year; and notwithstanding a slightly decreased production, it was very gratifying to be able to show an addition of £1566 to the receipts from this product. The cost of producing sulphate of ammonia, which had been until quite recently almost prohibitive, had now declined; and with prices stable, this commodity now showed an increased profit of £261. After providing for depreciation, a sum of £6731 was left as gross profit, and was carried to profit and loss account. Fixed charges, less interest on current account, absorbed £690, and the old suspense account had been written off. Adding together the unappropriated profits from last half-year and the gross profit earned in the six months under review, there remained a balance of net profit amounting to £8118. The dividend recommended would absorb £4986, leaving £3131 to be carried forward to the next half-year.

Mr. W. A. WARD, J.P. (Deputy-Chairman) seconded; and the report and accounts were unanimously adopted.

The CHAIRMAN moved a vote of thanks to the Engineer and General Manager (Mr. E. G. Hutchinson, A.M.I.Mech.E.), and to the staff generally. They had, he said, carried out their duties in an able and faithful manner; and it was due to the excellent work of the staff that they were able to present such a favourable report.

TAUNTON GAS LIGHT AND COKE COMPANY.

At the annual meeting of the Company, presided over by Mr. Robert Bruford, M.P., an immediate reduction of 6d. per 1000 c.ft. in the price of gas was announced; and a co-partnership and pensions scheme for employees of the Company was adopted.

The seventy-eighth report stated that the quantity of gas sent out during the year ended June 30 had been 155,443,800 c.ft.—an increase of 6,405,300 c.ft., or 4·2 p.ct. over that in the preceding twelve months. The amount available for dividend was £5492; and the Directors recommended payment for the year ended June 30 at the following rates: 5 p.ct. on the 1897 preference stock, 7 p.ct. on the 1920 redeemable preference stock, 9 p.ct. on the consolidated "A" stock, and 7⅞ p.ct. on the "Yellow" shares and on the new (1897) ordinary stock. This represented an advance of 1 p.ct. on the consolidated "A" stock, and of ⅞ p.ct. on the two subsequently named. The dividends will absorb £3713 for the second instalment, payable Sept. 30; an interim dividend having already been paid. The continued economies effected by the new carbonizing plant had enabled the Directors to wipe out the final amount standing to the debit of the retort renewals suspense account.

The CHAIRMAN, in moving the adoption of the report, said the Directors had for some time been considering the position of the staff in relation to the Company. They felt they had a good staff who deserved the best conditions possible, and they wished to institute for them a bonus scheme of co-partnership on the lines followed by some other gas companies. The Directors desired to give the workmen and staff a direct interest in the business; and they proposed to provide a fund for bonus to be applied on a sliding-scale. This scheme would give their employees an incentive to do their best for the Company. They suggested that the bonus should be invested in the stocks and shares of the Company.

Mr. W. J. VILLAR seconded, and remarked that they were going back that day to the largest pre-war dividend ever paid—9 p.ct.—as regards the 8 p.ct. stock.

The report was adopted, and a vote of thanks to the Directors was heartily accorded.

TRADE NOTES.

An English Holder for Canada.

The interesting announcement has been made by the London Press that Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, have secured a contract, in the face of keen American competition, for a tank and gasholder for the Montreal Light, Heat, and Power Company, to be erected at a cost of over £100,000.

"Supastone."

From the Wholesale Fittings Company, Ltd., of Nos. 23, 25, and 27, Commercial Street, E. 1, we have received a copy of their new "Supastone" gas supplement. "Supastone" is a three-ply glass consisting of two layers of clear glass and a centre layer of opal; the outside and inside surfaces being polished satin matted. This type of shade gives a soft white light free from glare, and the appearance is neat and tasteful.

Messrs. Reavell and Co., Ltd.

We have received from this firm a new pamphlet illustrating and describing their rolling-drum type rotary compressors for air and gas, and also gas-exhausters. The principle of these machines is the same; but many improvements have been embodied in their design, as is easily seen on reading the interesting publication. Descriptions of direct-driven compressors are included; and there is an illustration of a simple form of automatic belt-shafting device operated by the delivery pressure. A mechanical lubricator is also shown, which consists of a positive-type pump directly driven from the shaft of the compressor. The pump itself is contained in an oil reservoir which holds a suitable supply of oil; and the fitting is complete with a side-feed glass showing the oil delivery, and hand priming device.

Therms at Leeds.—After Sept. 10 Leeds gas will be charged on the thermal basis. The present price is 4s. per 1000 c.ft.; and under the new system the charges will be the same for a few months, at the end of which it is hoped to reduce the cost to the equivalent of 3s. 6d. per 1000 c.ft.

Gas Lecture at Lancaster.—Last week, Mr. G. Dixon, B.Eng., Assoc.M.Inst.C.E., the Lancaster Gas Engineer and Manager, gave an address on "Gas and Trade" to the members of the Lancaster Chamber of Trade. He said the price of gas in Lancaster was sufficiently low to enable it to be used by every trade. He advised traders to use gas as an illuminant outside their shop windows, so that their goods might be seen when the premises were closed. Such lamps and fittings should be under the supervision of the Gas Department. He could not imagine why people should keep clean everything in daily use except their gas appliances. Efficient maintenance should be included in the price paid for gas. Five of their largest consumers used gas-engines to drive their dynamos. The cost of gas per unit worked out at a halfpenny. In this country there were 2700 different trades for which gas was used; and the national question would arise as to why they should continue to burn enormous quantities of coal in factories when power could be obtained from gas-engines, and when the many bye-products of gas were of service to the nation. An interesting discussion followed; Mr. Dixon assuring traders that the competition with electricity was of the best kind. He was cordially thanked for his lecture.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The week has passed somewhat uneventfully in this market. While the firmer tone of the previous fortnight has been maintained, prices have not shown any great advance, if any at all. The strike of the American anthracite miners appears in a fair way of being settled, though definite and reliable news is scarce. In any case it must be a good way of bringing any new business to this market. As for the Italo-Greek crisis, it may have had the effect of speeding-up a few shipments of coal which had previously been sold for Italy; but it has not brought along fresh inquiry or orders.

While the position for prompt is considerably better than it was in the slump of a few weeks ago, and colliery terms are mostly booked up for a week or two ahead, there is little improvement in the outlook for forward business. Buyers and sellers are still unable in most cases to get together at all, the former holding off for very considerable reductions on current quotations, which collieries at present see no reason for offering. Consequently, business for next year is practically at a standstill.

Specials and best quality gas are firm at about 24s. to 25s., with seconds at 22s. to 23s. Prompt cargoes are sometimes to be had at below these figures, in cases where collieries are disappointed by tonnage, or, for any other reason, find themselves temporarily short of an outlet.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The demand for gas coal in Yorkshire and Lancashire is steadily improving; the electricity plants are taking larger deliveries of slacks; and the bye-product plants are taking the full production of good coking slacks. The house coal demand is becoming more brisk; but there is little or no improvement in the industrial consumption, although a better feeling is beginning to prevail. The volume of export trade is being checked by delay at the ports; but prices remain firm, with an upward tendency.

Latest Yorkshire prices include: Bunkers, Yorks., Derby, and Notts large screened steams, f.o.b. Humber ports, 21s. 6d. to 23s. 6d.; cargo for export f.o.b. usual shipping ports, best Yorks. hards (assn.) 26s. to 26s. 3d.; Derby best hards, 25s. 9d.; West Yorks. Hartleys, 22s. 6d. to 24s. 6d.; South Yorks. washed doubles, 26s. 6d.; South Yorks. washed singles, 26s. 3d.; dry doubles, 22s. 6d. to 23s.; South Yorks. washed smalls, 19s. 3d.; Derby slack, 1 in., 15s. 3d.; South Yorks. rough slack, 16s. to 17s.; gas coke, 36s. 6d.; foundry furnace coke, 43s.; washed smithy peas, 27s. to 30s.; washed steam thirds, 24s.; South Yorks. washed trebles, 26s. per ton.

In Lancashire, all colliery prices remain the same, and furnace coke is still quoted at 30s. per ton.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Apart from the quickening of demand for domestic supplies, there is little change in the situation in the Midlands. Certainly there is no expansion in the industrial consumption. Supplies are being sent forward from the collieries to some of the gas undertakings in excess of the ordinary storage capacity, and engineers are crying "Hold, enough!" Whatever flicker of business there may have been in the export market, it has done little to relieve congestion at the pits in this district. The indications are that the increased consumption of coal for lighting at the conclusion of "summer time" will be offset by a further decrease in the requirements for industrial power and heating. A few weeks ago the general returns of unemployment were fluctuating. Now they are showing a definite tendency in the wrong direction. The outlook gives rise to grave anxiety. Expectations of a revival in the iron trade have been disappointed thus far.

The position as to coke is full of uncertainty. It is considered likely that when representatives of the Midland blast furnaces meet their suppliers again at the middle of the month, the basis of 26s. at ovens will be modified. The iron market is so lifeless, however, and so much under the control of buyers, that it is doubtful whether the moderating of coke prices would in itself bring much advantage to the smelters. The difference between export and home prices is diminishing. Owing to the increased proportion of household coal which is now called for, the accumulation of slacks has become a serious problem. The price has fallen about 1s. per ton, and, failing an improvement in the demand for shipment, we shall be in for a recurrence of "the plague of slack."

Hastings and St. Leonards Gas Company.—The half-yearly meeting of the Company was held last Thursday, when the Directors submitted the accounts for the half-year ended June 30. A balance of £13,106 is shown. The price of gas was again reduced as from the midsummer meter readings to 1s. per therm (equivalent to 4s. 7·2d. per 1000 c.ft). In the corresponding period of 1914, the cost of coal was 21s. 10¾d. per ton, as compared with 35s. 10¾d. during the past half-year; and similarly the cost of labour per 1000 c.ft. was 7·24d., as against 13·63d. The Directors recommended payment of the following dividends (less income-tax) for the half-year: £6 15s. p.ct. on the 5 p.ct. converted stock, £5 5s. p.ct. on the 3½ p.ct. converted stock, and £6 4s. p.ct. per annum on the 5 p.ct. additional stock.

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September 17th—October 3rd, 1923

STOCK MARKET REPORT.

MARKETS in the Stock Exchange last week opened very shaky owing to the Greco-Italian difficulty and the Japanese calamity, which caused uneasiness in the insurance world. Prices fell freely, and only a few made any rally later on. Government stocks and Indian were hard hit. Home Rails were mostly lower, and Argentines also, though they partially recovered. The Foreign Market was a great sufferer at first, but amended later; French, Russian, Turkish, and Japanese being conspicuous in this respect. In the Miscellaneous Market, industrial concerns were rather better, Iron and Steel were firm, and Textiles were steady. Rubber was better; but Oils dull.

Business in the Gas Market was still below what might be called a fair average, and it presented no feature particularly interesting. Prices moved very moderately and were mostly upward. These were in British Gas Light, Imperial Continental, South Metropolitan, and Swansea. Continental Union and Primitiva debenture were easier.

The following transactions in gas during the week were recorded: On Monday, Bournemouth "B" 12⅜, Brentford "A" 102½, ditto "B" 103, European 8, Gas Light ordinary 96½, 96⅝, 96¾, 97⅛, 97¼, Imperial Continental 160, 160½, Primitiva 5 p.c. preference 30s. 3d., ditto 4 p.c. debenture 70⅜, South Metropolitan 97¾, 98, 98¼, ditto 3 p.c. debenture 62½, 62⅞, Tottenham "B" 100½, 101, 102, 102½, Wandsworth Wimbledon 113, British (Norwich) 4 p.c. debenture 77, Walton and Weybridge 7 p.c. maximum "B" 11⅜, 11 7/16. On Tuesday, Brentford "A" 103, British "A" 12, Commercial 4 p.c. 96½, European 7⅞, Gas Light ordinary 96½, 96⅝, 96¾, 97¼, ditto 3½ p.c. maximum 65¾, 66⅜, ditto 3 p.c. debenture 62½, Hong Kong 15½, Imperial Continental 161½, Primitiva 4 p.c. debenture 70, South Metropolitan 97¾, 98½, Wandsworth "B" 114½, Gloucester Consol 86½. On Wednesday, Gas Light ordinary 96⅞, 97½, Imperial Continental 5 p.c. preference 161, Primitiva 5 p.c. preference 30s., 31s., South Metropolitan 99, Southampton 90, Swansea 7 p.c. preference 103, 103½, Croydon 7½ p.c. preference 104. On Thursday, Bombay 5⅜, British "A" 12¼, 12⅜, ditto (Norwich) 3 p.c. debenture 58½. Commercial 4 p.c. 97, Continental Union 33, European 7 15/16, Gas Light ordinary 96⅞, 97, 97¼, 97⅜, ditto 3 p.c. debenture 62¾, 63¾, Imperial Continental 160½, Oriental 100, Primitiva 6s. 3d., ditto 5 p.c. preference 30s., South Metropolitan 97½, 98¼, 99, South Suburban 5 p.c. debenture 98½, Tottenham "B" 103, 104, Croydon 7½ p.c. preference 106. On Friday, British 12½, ditto "B" 11 Commercial 3½ p.c. 97, European 7⅞, Gas Light ordinary 96⅞, 97, 97¼, ditto 4 p.c. preference 81, ditto 3 p.c. debenture 63, Imperial Continental 161, 162¼, 162⅜, Liverpool 7 p.c. preference 107, Primitiva 7s., ditto 5 p.c. preference 31s., Tottenham "B" 103½, Colombo 9⅛, 9¼, ditto 7 p.c. preference 9¼.

In the Money Market, there was a cessation from those sharp alternations of hardness and ease upon which we animadverted in our last report. Contrary to a widely entertained forecast, terms stiffened materially, and held on thus to the close of the week. In the Discount market there was even greater rigidity, and rates ruled very stiff. Silver showed little change until Friday, when China and India were big buyers, and sent the price up to 31⅛d. The Bank of England rate is 4 p.c., as fixed on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
131,978	Stk.	Aug. 9	—	5%	Aldershot 5 p.c. max. C.	..	72—77	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	72—77	...
374,000	,,	July 12	4	4%	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5½—6½	5½—5¾	5¾
100,000	5	Aug. 9	16	8/6	Bournemouth Gas and Water { 5 p.c.	..	11¾—12⅛	..
383,110	10	,,	7	7/-	Bournemouth Gas and Water { B 7 p.c.	13—13½	11¾—12⅛	12⅛
115,000	10	,,	6	6/-	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	10⅞—11¾	...
162,065	—	June 28	—	4%	Bournemouth Gas and Water { 4 p.c. Deb.	..	77—82	...
992,045	Stk.	July 12	14	6/-	Brentford A Consolid.	261—266	100—105	102½—103
734,920	,,	,,	11	6/3	Do. B New	204—209	100—105	103
55,000	,,	,,	5	5%	Do. 3 p.c. Pref.	109—111	83—88	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	77—82	...
214,775	,,	Aug. 23	11	11¼%	Brighton & Hove Orig.	208—213	171—176	...
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	127—132	...
1,272,500	Stk.	July 26	5	5%	Bristol 5 p.c. max.	..	94—95	...
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	11¾—12⅛	12—12⅛
10,000	10	June 28	—	7/-	Do. 7 p.c. Pref.	..	11¾—12⅛	...
130,000	Stk.	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
230,335	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	56—59	...
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 28	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	70—75	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	106—111	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 26	5/9/4	60/-	Commercial 4 p.c. Stk.	106—108	94—97	96½—97
560,000	,,	,,	5½	60/-	Do. 3½ p.c. do.	103—105	94—97	97
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	58—62	..
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	33—38	33
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	72—77	...
660,000		Aug. 9	—	6½%	Croydon sliding scale.	..	101—104	...
284,975		,,	—	5%	Do. max. div.	..	81—85	...
492,270	Stk.	,,	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
200,000	,,	Apl. 5	—	5%	East Hull 5 p.c. max.	..	..	...
4,002,180	10	July 12	10	5/0	European, Ltd.	17½—18	7½—8½	7¾—8
16,546,120	Stk.	July 26	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord.	98—102	96—98	96½—97¾
2,600,000	,,	,,	3½	35/-	Gas Light and Coke { 3½ p.c. max.	76—79	65—68	65¾—66¾
4,062,235	,,	,,	4	4%	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	80—83	81
4,761,930	,,	June 14	3	3%	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	61—64	62½—63¾
130,000	,,	Dec. 11	10	10%	Gas Light and Coke { 10 p.c. Bonds	..	..	...
—	—	—	—	—	Gas Light and Coke { 7½ p.c. Ilford Deb.	..	..	...
84,500	,,	Mar. 8	5	65/7½	Hastings & St. L. 5 p.c.	..	92—97	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	15—16	15¾
86,600	Stk.	Aug. 23	9	9½%	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	May 31	9	£17	Imperial Continental	150—160	160—165	160—161¾
404,800	,,	Aug. 9	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	76—78	...
235,242	,,	,,	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	...
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	106—109	107
165,736	,,	Aug. 23	7/5/6	90/-	Maidstone 5 p.c.	..	104—109	...
63,480	,,	June 28	—	3%	Do. 3 p.c. Deb.	..	52—57	...
75,000	5	June 14	6	3/6	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4¼—4¾	3¾—4	...
100,000	100	Apl. 5	4½	4½%	Montevideo, Ltd.	99—101	97—100	...
341,920	Stk.	May 17	4	4%	Newcastle & Gatsh'dCon.	11½—12	50—55	...
1,875,892	,,	July 26	4½	4½%	Do. 4 p.c. Pref. Stk.	98¼—99½	84½—84¾	...
250,166	,,	Aug. 9	—	4%	Do. 3½ p.c. Deb.	..	74½—76½	...
589,705	,,	June 28	3½	3½%	North Middlesex 10 p.c.	82—83	72—73	...
15,000	10	—	—	7/6	,, ,, 7 p.c.	..	..	...
55,940	10	Aug. 23	7/14/0	7/8⅞	Oriental, Ltd.	14—15	11⅜—12⅛	...
900,000	Stk.	May 3	8	8%	Plym'th & Stonh'se 5 p.c.	117—122	97—102	100
188,120	Stk.	June 28	—	78/9	Portsea Island, B	..	106—110	...
60,000	50	Sept. 6	13	65/-	Do. C	128—131	100—105*	...
100,000	50	,,	12	60/-	Primitiva Ord.	118—121	97—102*	...
290,069	5	—	8	—	Do. 5 p.c. Pref.	5½—6	⅛—¼	6/3—7/-
499,960	5	—	5	—	Do. 4 p.c. Deb.	4¼—5	1⅝—2	30/—31/-
521,600	100	June 1	4	4%	Do. ,, ,, 1911	91—93	70—74	...
600,000	Stk.	July 26	4	4%	River Plate 4 p.c. Deb.	..	56—59	...
346,198	,,	June 28	4	4%	San Paulo { 6 p.c. Pref.	85—87	56—59	...
150,000	10	Mar. 22	6	6/-	San Paulo { 5 p.c. Deb.	10½—11	5⅜—6½	...
125,000	50	July 2	5	5%	Sheffield A	47—49	38—41	...
135,000	Stk.	Aug. 23	10	5%	Do. B	223—224	102—104	...
269,984	,,	,,	10	5%	Do. C	222—224	101—103	...
52,500	,,	,,	10	5%	Shrewsbury 5 p.c.	220—222	101—103	...
133,201	Stk.	Sept. 15	4	4%	South African	..	..	...
90,000	10	May 31	9	9/-	South Met. Ord.	10½—11½	7½—9½	...
6,609,893	Stk.	July 26	5/4/0	50/-	Do. Red. Pref.	111—113	97—99	97½—99
350,000	,,	July 12	—	5%	Do. 3 p.c. Deb.	..	98—100	...
1,895,445	,,	,,	3	3%	Do. 6½ p.c. Deb.	72½—74½	61—63	62½—62⅞
734,000	,,	Sept. 6	—	6½%	South Shields Con. Stk.	..	105—107*	...
91,500	,,	Aug. 23	8½	4½%	S'th Suburb'n Ord. 5 p.c.	157—159	127—129	...
1,087,795	,,	,,	6	6%	Do. 5 p.c. Deb. Stk.	114—116	100—103	...
368,837	,,	June 28	5	5%	S'th'mpt'n Ord. 5p.c. max.	116—118	95—100	98½
647,740	,,	May 3	5	7%	Do. 4 p.c. Deb. Stk.	99—102	88—91	90
121,275	,,	June 28	4	4%	Swansea 7 p.c. Pref. Stk.	..	72—77	...
250,000	,,	Aug. 23	—	70/-	Do. 6½ p.c. Deb. Stk.	..	102—104	103—103½
200,000	,,	June 28	—	6½%	Tottenham { A 5 p.c.	..	105—107	...
120,000	,,	July 26	—	8%	Tottenham { B 3½ p.c.	135—138	120—125	...
782,275	,,	,,	6	6½%	Tottenham { 4 p.c. Deb.	115—117	100—105	100½—104
181,255	,,	June 14	4	4%	Tynemouth 5 p.c. max.	87—89	78—82	...
258,251	Stk.	Aug. 23	1	2½%	Wandsworth, Wimbledon, and Epsom—	108½—109	88—90	...
30,000	,,	July 12	8½	90/-	Wandsworth A 5 p.c.	151—156	126—131	...
255,636	,,	,,	6½	75/-	Do. B 3½ p.c.	129—134	112—117	114½
108,075	,,	,,	—	68/-	Do. C	..	97—102	...
140,865	,,	,,	—	63/-	New Ordinary	..	97—102	..
352,000	,,	,,	6½	72/3	Wimbledon 5 p.c.	117—122	109—114	113
98,000	,,	,,	6½	76/3	Epsom 5 p.c.	121—126	112—117	...
88,416	,,	June 28	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

* Ex. div.

STOCK ISSUE.

By Order of the Directors.

NEW ISSUE OF PREFERENCE CAPITAL.

THE ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

(Incorporated by Special Act of Parliament, 1882.)

MESSRS. A. & W. RICHARDS

Are instructed to offer for SALE, by TENDER,

£15,000 NEW CAPITAL,

comprising

1500 £10 SIX PER CENT. PREFERENCE SHARES (IRREDEEMABLE),

MINIMUM PRICE OF ISSUE, PAR.

The Net Revenue of the Company last year was £10,529, of which the Interest on the Debenture Stock requires £2402, leaving a balance of £8126, sufficient to cover the dividend on the Preference Shares now being offered nine times. The Ordinary "A" and "B" Shares of the Company are receiving dividends of 8 per cent. and 7 per cent. respectively.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Thursday, Sept. 20, 1923) may be obtained of Messrs. A. & W. RICHARDS, 87, WALBROOK, LONDON, E.C. 4.

Demy 4to. Limp Cloth. Price 10s. 6d.

THE FLOW OF GASES and PROPORTIONING GAS MAINS.

By

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

WALTER KING, LTD., "GAS JOURNAL" OFFICES,

No. 11, Bolt Court, FLEET STREET, E.C.4.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 11.

The London pitch market is quiet, though there are some large inquiries on hand. As no important transactions are reported, the present price is nominal at about 145s. net per ton. There is only a limited quantity of creosote available, and the price is 9¾d. to 10d. net per gallon. Motor benzole is somewhat easier in price; the demand being rather less than is usual at this time of the year. There is no change in other products.

Tar Products in the Provinces.

Sept. 10.

The market for pitch is decidedly quiet, partly no doubt because buyers are still largely absent from business, and probably are covered for their immediate requirements. Business is reported to have been done on the East Coast at 130s. f.o.b.; while indications from the Continent are that buyers would not at present exceed 125s. The majority of makers, however, appear to be confident that inquiries will come along at an early date, and that there will then be an improvement in price. Creosote is steady; and there is still a good demand for this. White products are weak and out of sale. Cresylic acid is steady. Crude carbolic is firm, and the Continent are reported to be in the market; but business in crystals carbolic still remains quiet.

The average values for gas-works products during last week were: Gas-works coal tar, 76s. to 81s. Pitch, East Coast, 130s. to 132s. 6d. f.o.b. West Coast—Manchester, 127s. 6d. to 130s.; Liverpool, 128s. 6d. to 131s. 6d.; Clyde, 128s. 6d. to 131s. 6d. Benzole 90 p.ct., North, 1s. 2½d. to 1s. 3½d.; crude 65 p.ct. at 120° C., 10d. to 10½d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Tully Plant at Colne.—The Gas Engineer of the Colne Corporation recently reported to the Town Council upon the satisfactory working of the Tully gas plant; and his recommendation to instal a second generator with the necessary accessories, at an estimated cost, including foundations, of £1585, was approved, the cost to be charged to the gas revenue outlay account.

New Chairman for the Barrow Gas Committee.—The Barrow Gas and Water Committee have elected Councillor Ormandy Smith to the chairmanship rendered vacant by the death of Ald. A. Brown. There was a warm discussion on the matter at the Barrow Town Council last week, when an amendment that Alderman J. Whimmerah, the Vice-Chairman, be elected, resulted in a tie. The Mayor, following precedent, gave his casting vote in favour of the Committee's recommendation. Councillor Smith, the new Chairman, has had a thorough training in engineering, and for several years has been in charge of the labour bureau at Messrs. Vickers naval construction works, Barrow. He was only elected to the Town Council in November, 1920; but an appreciation of his qualities is found in the fact that, besides being Chairman of the Gas and Water Committee, he is also Vice-Chairman of the Corporation's Electricity Committee.

New Capital Issue by the Ascot Company.—As will be seen by an announcement which appears elsewhere in this issue, Messrs. A. & W. Richards have received instructions to offer for sale by tender £15,000 of new capital, comprising 1500 £10 6 p.ct. preference shares, in the Ascot District Gas and Electricity Company. The Company's district has attained considerable popularity as a place of residence for business men engaged in the City. Before the war extensive developments took place in the neighbourhood; and now that conditions are becoming more normal, there are indications that this development is being resumed. The sales of gas last year were upwards of 60 million c.ft., and the consumption of electricity was 277,000 units. The capital now being raised is required for extensions of the Company's works, plant, mains, &c., necessary to enable the growing demands for both gas and electricity to be met. The minimum price of issue is par; and tenders must be sent in by eleven o'clock on the 20th inst.

Falmouth Gas Company.

At the annual meeting of the Falmouth Gas Company, Mr. F. J. Bowles (Chairman) stated that the Company had received a notice of application from the Penryn Gas Company for certain statutory powers. While the Falmouth Company had no desire to act the part of the "dog in the manger," they considered it their duty to protect their own interests, and had accordingly lodged an objection against any portion of their district being included with the Penryn Company's powers. They objected to the latter Company or any other company coming into their district. While the Company had reduced the price of gas, they had also increased the dividend, and had reached for the first time since the war the pre-war figure. They had extended their mains to a considerable distance, and were prepared to go further in any direction if there was reasonable chance of satisfactory business forthcoming. Moving the adoption of the report, he stated that two reductions had been made in the price of gas during the year, and a further reduction of 1d. per therm would be made at Michaelmas. It was stated that the sale of gas had been increased by 1,071,200 c.ft.; and the calorific value had been raised to 500 B.Th.U. An interim dividend of 5 p.ct., less income-tax, had been paid up to Dec. 31 last; and the Directors recommended payment of a final dividend of 6½ p.ct. for the year ended June 30.

Castle Donington Lighting.—Enterprise upon the part of the Long Eaton Gas Company, in meeting the needs of outside areas, was again exemplified at the last assembly of the Castle Donington Council, when an alternative scheme, which had been suggested in regard to the lighting of that town, was adopted. The Company, while unable to make any abatement upon the original terms, agreed to provide for the automatic lighting and extinguishing of all the public lamps; it being stipulated that, in view of the considerable expense inseparable from the installation of special mechanism for this purpose, the agreement should operate for five years. The price will vary with any rise or fall in the cost of gas.

Gas Prices Again Reduced at Newcastle.—The Newcastle and Gateshead Gas Company have decided to reduce the price of gas as from June last by three-fifths of a penny per therm, which is equivalent to about 3d. per 1000 c.ft. This is the fifth reduction that has been made in eighteen months, making a total of 5d. per therm. The reduction will be shown on the next gas accounts which consumers receive. The price is now less than 8d. per therm. The Company expect with this reduction that the number of gas-fires will be increased during the winter months. In the windows of the Company's offices there will shortly be shown several illustrations of what can be done with a pennyworth of gas.

Burt, Boulton, and Haywood.—This Company, who, among other things, do business as timber merchants and tar distillers, announce a profit of £43,721, after writing-off £10,000 for depreciation. As £2399 was brought forward, there is £46,120 available. Of this no less than £20,000 is to go to the reserves, which will then amount to £314,962. A dividend of 4 p.ct., making 8 p.ct. (free of tax) for the twelve months ended June last, is proposed; and the balance carried forward will be increased to £10,163. Referring to the Company's Belgian reparation claims, the Directors state that, while compensation has been awarded to Belgian firms for damage suffered during German occupation, the Company's very substantial claim for damages suffered to its Selzaete works remains unsatisfied. The Company have the power to issue additional ordinary shares for £90,000; and it is proposed to offer them to the present shareholders.

The local Citizens' Association are asking for an inquiry into the cost of gas in Dublin.

The Blackburn Town Council have approved a proposal of the Gas Committee to open new gas showrooms in King William Street—the centre of the borough. A resolution to move the matter back on the score of expense was defeated.

The Alnwick Gas Company have agreed to allow the Urban District Council a discount of 10 p.ct. on the charge for gas consumed in lighting the streets of the town. The Company have also agreed to lay the mains, free of cost, for lighting the new buildings in the Swansfield Park Road area.

At the annual meeting of the Wigton Gaslight and Coke Company, Ltd., the Directors recommendation was adopted that a dividend for the year ended June 30 of 16s. (8 p.ct.) per share, free of income-tax, be paid, carrying forward £1280, subject to the payment of corporation profits tax. During the year, 234 new shares of £10 each had been created and taken up by the existing shareholders. The price of gas had been increased by 1s. per 1000 c.ft.

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